SPECIFIED GAS EMITTERS REGULATION

TECHNICAL GUIDANCE DOCUMENT FOR BASELINE EMISSIONS INTENSITY APPLICATIONS

JULY 18, 2007

Alberta
ENVIRONMENT

ALBERTANS & CLIMATE CHANGE

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The information provided in this document is intended as guidance only. This document is not a substitute for the law. Please consult the *Specified Gas Emitters Regulation* and the legislation for all purposes of interpreting and applying the law. In the event that there is a difference between this document and the *Specified Gas Emitters Regulation* or legislation, the *Specified Gas Emitters Regulation* or the legislation prevail.

Any comments or suggestions regarding the content of this document may be directed to:

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Process for Discussion of Baseline Emissions Intensity Application Related Questions:

Please submit any questions relating to the Baseline Emissions Intensity Application to: AENV.GHG@gov.ab.ca to ensure inquiries are tracked and addressed in the most efficient manner.

Please include the following in your submission (as applicable):

- The nature of the request (questions around baseline years, new vs. established facility etc.)
- Any specifics you would like the Department to consider (in particular, the source of the issue, concern, etc.).
- Whether the issue is likely a common issue with similar facilities in your sector.

An Alberta Environment representative will then either answer your question via e-mail or contact you to further discuss your question.

This process is not intended to serve as a pre-approval or decision relating to requirements under the *Specified Gas Emitters Regulation (Regulation)*. It is intended to address issues in support of completing a Baseline Emissions Intensity Application Form. The final decision on matters rests with the Director under the *Regulation*.

Should you wish to pursue an alternate method for Baseline Emissions Intensity please provides both scenarios with your Baseline Application: method as per *Specified Gas Emitters Regulation* and proposed alternate method including evidence as to why the method in the *Specified Gas Emitters Regulation* is not appropriate.

Please note that in any event your Baseline Emissions Intensity Application Form must be submitted to the Department by the deadline for applying for a baseline emissions intensity as specified in section 20 of the *Regulation*.

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Abbreviations

AENV	Alberta Environment
BEI	Baseline Emissions Intensity
CH_4	Methane
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DUNS	Data Universal Numbering System
EPEA	*Environmental Protection and Enhancement Act*
EUB	Energy and Utilities Board
GJ	Gigajoule
GWP	Global Warming Potential
h	Hour
HFC	Hydrofluorocarbons
HHV	Higher Heating Value
IP	Industrial Process Emissions
kg	Kilogram
kj	Kilojoule
kt	Kilotonne
LHV	Lower Heating Value
MWh	Megawatt-hour
N_2O	Nitrous Oxide
N/A	Not Applicable
NGCC	Natural Gas Combined Cycle
NAICS	North American Industry Classification System
NPRI	National Pollutant Release Inventory
P	Production
PFC	Perfluorocarbons
SF_6	Sulphur Hexafluoride
SoC	Statement of Certification
SoQ	Statement of Qualification
SoV	Statement of Verification
TDE	Total Direct Emissions
TAE	Total Annual Emissions

1.0 Purpose of the Document

The purpose of this document is to assist the Person Responsible with determining whether their facility is subject to the *Specified Gas Emitters Regulation* (the *Regulation*) and with the completion of the Baseline Emission Intensity Application (the Application) required under the *Regulation*. This technical document provides instructions on how to fill out the Baseline Application forms and provides guidance for the tasks of the Third Party Auditor.

2.0 Introduction

The *Specified Gas Emitters Regulation* is a strategic regulation that confirms Alberta's intent to set greenhouse gas intensity limits for large emitters of greenhouse gases in Alberta. The *Regulation* is an important step in delivering on the current Alberta climate change action plan. The *Regulation* applies to all facilities in Alberta that emitted equal to or greater than 100,000 tonnes of greenhouse gas emissions in carbon dioxide equivalent (CO_2e) units in 2003 or in any year since. The emissions threshold is consistent with the emissions reporting threshold under the existing *Specified Gas Reporting Regulation*, which has been in force since 2004.

Annual emissions intensity reduction

Under the *Regulation* a 12% intensity reduction will be applied to the average of that facility's 2003-2005 baseline emissions intensity for established facilities. **Established** facilities are those that completed their first year of commercial operation before January 1, 2000, or have completed eight years of commercial operation. **New** facilities are those that completed the first year of commercial operation on December 31, 2000 or a subsequent year and have completed less than eight years of commercial operation. Emission intensity reductions for new facilities will be phased in over a 6-year period. The baseline emissions intensity for new facilities will be established based on the third year of commercial operation. New facilities are required to reduce emissions starting with the fourth year of commercial operation by 2%, and then by 2% every year after, until the 12% reduction target has been achieved.

Options to meet emissions intensity reduction targets

If the emissions intensity reduction target is not met through improvements in operations, a facility subject to the *Emitters Regulation* may utilize the following compliance tools:

1. Climate Change and Emissions Management Fund (the fund): Pay $15 per tonne of CO_2e, (Fund Credits) into the Fund to meet reduction requirements.
2. Alberta based offsets: Purchase Emission Offsets generated from projects by facilities not subject to the *Regulation*. The offsets must be from Alberta-based projects which occurred after January 1, 2002.
3. Emissions Performance Credits: The facility may purchase Emission Performance Credits from a different Alberta facility.

If a facility reduces its emissions intensity below its target, the facility can generate Emission Performance Credits. These Credits can be banked, or traded to other Alberta facilities.

3.0 Baseline Application Process

The baseline application process is outlined in Figure 1. In order to determine whether a facility is subject to the *Regulation* and to fulfill the baseline determination requirements of the *Regulation*, several steps must be taken:

1. Determine if the facility's total direct emissions were equal to or greater than 100 kilotonnes (kt) CO_2e in any one year since the year 2003.
    a. If the facility's emissions are below the threshold of 100 kt CO_2e, the facility is not subject to the *Regulation*.

2. Determine the facility's baseline emission intensity:
    a. If the facility completed its first year of operation before January 1, 2000, or has completed 8 years of operation, it is considered an established facility and the facility baseline must be established on the average emissions intensity of the years 2003-2005.
    b. If the facility completed its first year of commercial operation on December 31, 2000 or a subsequent year and has completed less than 8 years of commercial operation, or is a facility designated as a new facility under subsection (2) of the *Regulation*, it is considered a new facility. For new facilities the baseline must be established from the third year of commercial operation.

3. Complete the appropriate Baseline Emissions Intensity Application form. Four different Baseline Application forms are provided, one for established facilities and one for new facilities, one for established stand-alone cogeneration facilities and one for new stand-alone cogeneration facilities.

4. Submit the following completed documents to Alberta Environment by the deadline for applying for a baseline emissions intensity as specified in section 20 of the *Regulation*:

    - Third Party verified Baseline Emissions Intensity Application form (Excel format, named *Facility ID_Facility Name_BAF2007.xls*)
    - Third Party Auditor's Report (PDF format, named *Facility ID_Facility Name_AudRep2007.pdf*)
    - The signed Conflict-of-Interest Checklist,
    - The signed Statement of Certification form,
    - The signed Statement of Qualification form,
    - The signed Statement of Verification form, and
    - If required, a Confidentiality Request

Additional supporting documents that are not specified above (detailed emissions calculations, supporting data, etc.) must be made available upon request to Alberta Environment.

The Application Form and the Third Party Auditor's Report must be submitted electronically to Alberta Environment via e-mail to:

SGR@gov.ab.ca

For administrative purposes e-mail the Baseline Application and Third Party Auditor's Report for only one facility at a time. The Person Responsible will receive a confirmation email that the Baseline Application and Third Party Auditor's Report was received.

The Baseline Application and Third Party Auditor's Report may also be submitted to Alberta Environment on a CD or DVD. If one person is the Person Responsible for several facilities covered under the *Regulation*, the Baseline Applications and Third Party Auditor's Reports for several facilities may be added to one CD or DVD and sent to Alberta Environment.

5. Originals (not photocopies) of the signed Statement of Certification, Statement of Qualification and Statement of Verification must be submitted via mail or courier to the address below.

6. Confidentiality requests (where required), including the justification and supporting documentation must be submitted to Alberta Environment by mail or courier by the deadline for applying for a baseline emissions intensity as specified in section 20 of the *Regulation*.

7. Documents (excluding those submitted via email) must be sent to:

   Director
   Alberta Environment
   12th Floor, Oxbridge Place
   9820-106 Street
   Edmonton, Alberta
   T5K 2J6

8. Once the Baseline Application and the other required documents have been received by Alberta Environment, the Director will review the Application and will inform the Person Responsible in writing that:

   - The baseline emissions intensity for the facility has been accepted, or
   - The Director has prescribed the facility a baseline emissions intensity.

If a confidentiality request has been submitted, the facility will receive notification of the Director's decision regarding the request within 150 days of the deadline for applying for a baseline emissions intensity as specified in section 20 of the *Regulation*. The Director may ask for additional information for evaluation of the Baseline Application including the confidentiality request in order to make a decision.

Determine if facility's GHG emissions exceeded 100 kt CO_2e threshold
Determine if facility is "established" or "new"
Use Baseline Application for "established facilities"
Use Baseline Application for "new facilities"
Verify Baseline Application and associated documents using a qualified Third Party Auditor
Verify Baseline Application and associated documents using a qualified Third Party Auditor
Submit Baseline Application to AENV by date specified in section 20 of the *Regulation*.
Submit Baseline Application to AENV by date specified in section 20 of the *Regulation*.
Submit Baseline Application to Alberta Environment by June 1st*.
Baseline Application is reviewed by AENV
Baseline Application is reviewed by AENV
Is sufficient information provided and is verification adequate?
Is sufficient information provided and is verification adequate?
Yes
No
Yes
No
Additional supporting information and/or verification is requested.
Additional supporting information and/or verification is requested.
Assessment completed and Director approves or restates Baseline
Assessment completed and Director approves or restates Baseline
Director notifies Certifying Official in writing
Director notifies Certifying Official in writing

Figure 1: Baseline Application Process for the *Specified Gas Emitters Program*.

*__Note__: The deadline for the submission of a Baseline Application for a new facility is the later of June 1, 2008 and June 1 of the 4th year of commercial operation of the facility, in the case of a facility that comes into existence after the coming into force of the *Specified Gas Emitters Regulation* and that has direct emissions of 100,000 tonnes of CO_2e or more in any of the first 3 years of commercial operation.

4.0 Estimation and Reporting of Specified Gases

The *Specified Gas Emitters Regulation* applies to any facility that releases 100 kt or more of CO_2e based on the sum of direct emissions of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulphur hexafluoride (SF_6). Table 1 provides a list of the specified gasses subject to the *Regulation* including their 100-year global warming potential.

Table 1: Specified Gases and Gas Species Subject to the *Regulation*.

Specified Gas	Formula	100-year GWP
Carbon dioxide	CO_2	1
Methane	CH_4	21
Nitrous Oxide	N_2O	310
Sulphur Hexafluoride	SF_6	23900
Perfluorocarbons (PFC)		
Perfluoromethane	CF_4	6500
Perfluoroethane	C_2F_6	9200
Perfluoropropane	C_3F_8	7000
Perfluorobutane	C_4F_{10}	7000
Perfluorocyclobutane	c-C_4F_8	8700
Perfluoropentane	C_5F_{12}	7500
Perfluorohexane	C_6F_{14}	7400
Hydrofluorocarbons (HFC)		
HFC-23	CHF_3	11700
HFC-32	CH_2F_2	650
HFC-41	CH_3F	150
HFC-43-10mee	$C_5H_2F_{10}$ (structure: $CF_3CHFCHFCF_2CF_3$)	1300
HFC-125	C_2HF_5	2800
HFC-134	$C_2H_2F_4$ (structure: CHF_2CHF_2)	1000
HFC-134a	$C_2H_2F_4$ (structure: CH_2FCF_3)	1300
HFC-143	$C_2H_3F_3$ (structure: CHF_2CH_2F)	300
HFC-143a	$C_2H_3F_3$ (structure: CF_3CH_3)	3800
HFC-152a	$C_2H_4F_2$ (structure: CH_3CHF_2)	140
HFC-227ea	C_3HF_7 (structure: CF_3CHFCF_3)	2900
HFC-236fa	$C_3H_2F_6$ (structure: $CF_3CH_2CF_3$)	6300
HFC-245ca	$C_3H_3F_5$ (structure: $CH_2FCF_2CHF_2$)	560

4.1 Source Categories

The reporter is required to disaggregate and report emissions of CO_2, CH_4, N_2O, HFC, PFC, and SF_6 by the following source categories:

- Stationary Fuel Combustion
- Industrial Process
- Venting
- Flaring
- Other Fugitive
- On-site Transportation
- Waste and Wastewater
- Vented Raw Gas
- CO_2 Emissions from the Combustion of Biomass
- CO_2 Emissions from the Aerobic Decomposition of Waste

A summary of the reporting requirements for each source category by specified gas is presented in Table 2.

Table 2: Summary of Reporting Requirements by Source Category and Specified Gas

Source Category	Specified Gas	Reported	Threshold (TDE)	Baseline (TAE)
Stationary Fuel Combustion (Includes CH_4 and N_2O emissions from the combustion of biomass)	CO_2, CH_4, N_2O	✓	✓	✓
Industrial Process	All*	✓	✓	×
Venting (Does not include vented raw gas)	CO_2, CH_4, N_2O	✓	✓	✓
Flaring (Does not include flaring of landfill gas)	CO_2, CH_4, N_2O	✓	✓	✓
Other Fugitive	CO_2, CH_4, N_2O	✓	✓	✓
Vented Raw Gas	CO_2	✓	✓	✓
Waste and Wastewater (Includes emissions from incineration of non-biomass waste and CH_4 & N_2O emissions from decomposition of waste and CH_4 & N_2O emissions from flaring of landfill gas)	CO_2, CH_4, N_2O	✓	✓	✓
On-site Transportation	CO_2, CH_4, N_2O	✓	✓	✓
CO_2 Emissions from the Combustion of Biomass (Includes CO_2 emissions from combustion of biomass, incineration of waste biomass and flaring of landfill gas)	CO_2	✓	✓	×
CO_2 Emissions from the Aerobic Decomposition of Waste	CO_2	✓	✓	×

* Note: HFC, PFC and SF_6 emissions from industrial product use only are included in the threshold and baseline calculations.

Sections 4.1.1 to 4.1.10 provide additional information on each source category.

4.1.1 Stationary Fuel Combustion

Direct emissions resulting from non-vehicular combustion of fossil or biomass fuel at the facility for the purpose of energy production (i.e. to generate electricity, heat or steam) are considered stationary fuel combustion emissions. This does not include CO_2 emissions from the combustion of biomass, but does include N_2O and CH_4 emissions from biomass combustion.

Stationary fuel combustion is a common source of greenhouse gas emissions and is produced in most industrial sectors. The stationary fuel combustion source category includes on-site waste incineration if the waste is combusted for the purpose of energy production. Emissions from waste incineration when used as a disposal method must be included in the Waste and Wastewater source category.

Note: Biomass
Combustion of Biomass: CO_2 emissions from the combustion of biomass must be reported in a separate source category (CO_2 Emissions from the Combustion of Biomass) and included in the calculation of the emissions threshold (TDE) but not included in the calculation of total annual emissions (TAE) for the facility. N_2O and CH_4 emissions from biomass combustion must be reported in the Stationary Fuel Combustion source category and included in the total annual emissions (TAE) emissions.

4.1.2 Industrial Process

Direct emissions from an industrial process involving chemical or physical reactions, other than combustion, and where the primary purpose of the industrial process is not energy production are considered industrial process emissions. This includes mineral, metal and chemical production. This source category is more sector-specific than stationary fuel combustion and is not found in all industrial sectors.

Note: *Where industrial process emissions are produced in combination with emissions from fuel combustion for energy purposes, the emissions must be included in the source category for the primary purpose of the activity. If the primary purpose of the activity is the generation of energy, then the emissions must be included in the Stationary Fuel Combustion source category. If the primary purpose of the activity is process-related, then the emissions must be included in the Industrial Process source category.*

4.1.3 Venting

Direct emissions from intentional releases to the atmosphere of a waste gas or liquid stream and including without limitation: emissions of casing gas, treater, stabilizer, dehydrator off-gas, blanket gas and emissions from pneumatic devices, which use natural gas as a driver, compressor start-up, pipeline and other blowdowns and metering and regulation station control loops, are considered venting emissions. Vented raw gas emissions are not included in this source category.

4.1.4 Flaring

Direct emissions from the controlled combustion of a gas or liquid stream produced on site not for the purpose of energy production and including without limitation emissions arising from waste petroleum incineration, hazardous emissions prevention systems (whether in pilot or active mode), well testing, natural gas gathering systems, processing plant operations, crude oil production, pipeline operations, petroleum refining and chemical fertilizer and steel production are considered flaring emissions.

CO_2 emissions from the combustion of landfill gas are not included in flaring emissions but are included in the CO_2 Emissions from the Combustion of Biomass source category. CH_4 and N_2O emissions from the combustion of landfill gas must be reported in the Waste and Wastewater source category.

4.1.5 Other Fugitive

Direct emissions that do not fall under stationary fuel combustion emissions, industrial process emissions, venting emissions, flaring emissions, on-site transportation emissions, waste and wastewater emissions, vented raw gas emissions, CO_2 emissions from the combustion of biomass or CO_2 emissions from aerobic decomposition and including without limitation intentional or unintentional releases of gases arising from the production, processing, transmission, storage and use of solid, liquid or gaseous fuels are considered other fugitive emissions.

In general, emissions from other fugitive sources are a result of the handling or processing of various types of fuel in the fossil fuel industry. Other fugitive sources could include leaks from natural gas transmission lines and processing plants, accidental releases from oil and gas wells and releases from the mining and handling of coal.

4.1.6 Vented Raw Gas

Direct emissions of carbon dioxide that is recoverable or is recoverable at a well from an underground reservoir and that is gaseous at conditions under which its volume is measured or estimated are considered vented raw gas emissions. This source category includes, but is not limited to, CO_2 emissions vented from gas sweetening and formation gas.

4.1.7 Waste and Wastewater

This source category refers to direct emissions from on-site waste disposal and waste or wastewater treatment. It may include without limitation sources of emissions from on-site waste disposal and waste or wastewater treatment at a facility such as landfilling of solid waste, flaring of landfill gas, treatment of liquid waste and waste incineration.

***Note**: Emissions resulting from waste to energy operations where waste materials are used directly as a fuel or converted to fuel must be included in the Stationary Fuel Combustion source category.*

Note: Landfill Gas

CO_2 emissions from flaring of landfill gas must be reported in the CO_2 Emissions from the Combustion of Biomass source category, as landfill gas is considered a biomass material and included in the emissions threshold calculation but not included in the calculation of the total annual emissions (TAE) for the facility. CH_4 and N_2O emissions from flaring of landfill gas must be reported in the Waste and Wastewater source category and included in the emissions threshold calculation and the total annual emissions (TAE) for the facility.

4.1.8 On-site Transportation

Direct emissions resulting from fuel combustion in machinery used for the on-site transportation of products and materials integral to the production process are considered on-site transportation emissions.

Examples are the transportation of raw or intermediate products and materials within the production process; such as equipment used at an oil sands operation to mine and/or move materials to subsequent on-site processing, or equipment used at above or below ground mining operations to mine and/or move mined materials or other intermediate products or materials to different on-site production processes.

4.1.9 CO_2 Emissions from Biomass Combustion

Carbon dioxide emissions from the combustion of biomass are the direct emissions from the combustion of plant materials, animal waste or any product made of either of these and includes without limitation wood and wood products, charcoal, agricultural residues and wastes including organic material above and below ground, both living and dead, such as trees, crops, grasses, tree litter, roots, municipal and industrial wastes where the organic material is biological in origin, landfill gas, bio-alcohols, black liquor, sludge gas, animal or plant-derived oils.

For the Baseline Emissions Intensity Application carbon dioxide emissions from the combustion of biomass must be calculated and included in the calculation of the

emissions threshold but not included in the calculation of the total annual emissions (TAE) for the facility.

CH_4 and N_2O emissions from the combustion of biomass must be reported in the Stationary Fuel Combustion source category, included in the calculation of the emissions threshold and included in the calculation of the total annual emissions (TAE) for the facility.

Note: Waste Incineration
Carbon dioxide emissions from waste incineration of biomass must be reported in the CO_2 Emissions from the Combustion of Biomass source category and included in the calculation of the emissions threshold but not included in the calculation of the total annual emissions (TAE) for the facility. The carbon dioxide emissions from waste incineration of fossil fuel-based (non biomass) materials must be reported in the Waste and Wastewater source category and included in the emissions threshold calculation and the total annual emissions (TAE) for the facility.

Note: Flaring of landfill gas
CO_2 emissions from flaring of landfill gas must be reported in the CO_2 Emissions from the Combustion of Biomass source category, as landfill gas is considered a biomass material. It must be included in the determination of the emissions threshold but not included in the calculation of the total annual emissions (TAE) for the facility. The CH_4 and N_2O emissions from flaring of landfill gas must be included in the Waste and Wastewater source category, included in the emissions threshold calculation and the total annual emissions (TAE) for the facility.

4.1.10 CO_2 Emissions from Aerobic Decomposition of Waste

CO_2 emissions resulting from the aerobic decomposition of biomass materials in waste must be reported and included in the emissions threshold calculation but not included in the total annual emissions (TAE) for the facility. CH_4 and N_2O emissions from waste decomposition must be reported in the Waste and Wastewater source category and included in the emissions threshold calculation and the total annual emissions (TAE) for the facility.

4.2 Reporting of Hydrofluorocarbons (HFC), Perfluorocarbons (PFC) and Sulphur hexafluoride (SF_6)

Emissions of HFC and PFC are reported by each individual species (see Table 1 for species). For SF_6 the total for all sulphur hexafluoride emissions must be reported. Emissions of HFC, PFC or SF_6 must be reported in the Baseline Application and included in the determination of the total annual emissions (TAE). However, the emissions from industrial process sources should not be included in the total annual emissions.

Note: HFC, PFC, SF_6
Reporting of HFC, PFC and SF_6 emissions is limited to industrial process and industrial product use.

4.2.1 HFC

Hydrofluorocarbons are a series of synthetic gases that contain carbon, hydrogen and fluorine. Although emissions of hydrofluorocarbons are usually very small, species of HFC often have very large global warming potentials, ranging from 140 to 11700 (see Table 1). Sources of HFC emissions from industrial process and industrial product use include emissions from foam blowing and the use of HFC as a cover gas in metal production.

HFC emissions from other applications such as refrigeration, air conditioning, aerosol propellants, fire extinguishers, some solvents, etc, are not considered industrial process or industrial product use and must not be reported under the *Regulation*.

4.2.2 PFC

Perfluorocarbons are a family of industrial gases. Although emissions of perfluorocarbons are usually very small, species of PFC have significant global warming potentials, ranging from 6500 to 9200 (see Table 1). Sources of PFC emissions from industrial process and industrial product use include aluminium production and foam blowing.

PFC emissions from other applications such as refrigeration, air conditioning, semiconductor manufacturing, aerosol propellants, fire extinguishers, some solvents, etc are not considered industrial process or industrial product use and must not be reported under the *Regulation*.

4.2.3 SF_6

Sulphur hexafluoride is a synthetic gas that is relatively inert due to its specific chemical properties. Emissions of sulphur hexafluoride are usually small, but due to its significant global warming potential of 23,900 it must be reported and included in the baseline determination. Sources of SF_6 from industrial process and industrial product use are uses such as a cover gas in magnesium smelting and casting, as foundry products in the aluminium industry, or as an insulting gas in electrical equipment such as circuit breakers.

SF_6 emissions from other applications such as fire suppression, explosion protection, leak detection and electronic applications are not considered industrial process or industrial product use and must not be reported under the *Regulation*.

4.3 Emission Estimation Methodologies

For the different categories of emission sources, there are several measurement and calculation options available. There is an associated level of accuracy with the measured parameter data (e.g., fuel consumption) and the calculation method (e.g., mole balance). Alberta Environment encourages the use of data of highest accuracy possible (refer to Table 3 below). The prioritization of effort in the measurement and calculation of greenhouse gas emissions is recommended. The most time and effort should be spent on the largest sources of greenhouse gas emissions.

Table 3: Relative Accuracy of Emission Estimation Methodologies

Measured Data	Accuracy*	Calculation
Monitoring or direct measurement	Most	Mole balance with efficiency factors
Intermittent (periodic) direct measurement		Equipment-specific emission factors
Calculated based on measured surrogate parameters		Manufacturer's emission factors
Extrapolated from historical data		Models based on surrogate parameters
Estimated from design requirements		Generic emission factors
Estimated from agreements	Least	Top-down emission factors

* This is a general rule of thumb when examining measured parameters and calculations. There is overlap between the categories and under certain conditions the order of these categories will change.

The following is a description of the six measured data categories in decreasing order of accuracy:

- Monitoring or direct measurement uses Continuous Emissions Monitoring Systems (CEMS). Where greenhouse gases are directly measured, a calculation methodology does not need to be specified.
- Intermittent (periodic) direct measurements use source (stack) testing, which is a "snapshot measurement in time". The measurement result is then extrapolated over a period of time to determine emission values for that period of time.
- Calculated based on surrogate measures uses correlations developed between measured emission rates and related parameters. This is the most common form of measurement (e.g., fuel consumption).
- Extrapolation from historic data uses past information to determine current operating conditions (e.g., runtime and loads).

- Estimates from design requirements uses design information and facility configuration to determine likely values (e.g., power requirements for equipment determine fuel consumption).
- Estimates from agreements use contractual arrangements to provide a product or service to determine likely values (e.g. power supplied, fuel delivered).

Alberta Environment does not recommend using a method of measurement that includes or falls below the category of extrapolation of historic data unless it can be shown that this level of accuracy in the calculation will not materially effect the submission.

The following is a description of the six calculation categories in decreasing order of accuracy:

- Mole balance with efficiency factors determines an emission factor based on the mole balance of carbon between the input and the output of a source, with some assumed efficiency factor.
- Equipment-specific emission factors are determined based on the measurement of the input and output of the equipment at an operating condition similar to normal operations.
- Manufacturer's emission factors are determined based on manufacturer testing.
- Models based on surrogate parameters can derive emission factors based on scientific models that do not have a parameter directly related to the emission (e.g. soil surface temperature and methane emissions from a coal pile).
- Generic emission factors based on a sample of equipment.
- Top-down emission factors based on the aggregate numbers averaged over a large population.

Alberta Environment does not recommend using a method of calculation that falls below the category of generic emission factor unless it can be shown that this level of accuracy in the measurement will not materially effect the submission.

For ease of use, Alberta Environment has reviewed and deemed acceptable the calculation methods listed in Table 4. Please note that these calculation methods might not cover all applicable industries in Alberta.

In situations where the required calculation is not included in Table 4, or a facility-specific method leading to an emissions estimate of higher accuracy has been developed, and the lower accuracy in the calculation using the accepted method may effect the final submission, the facility may propose a facility-specific calculation method.

Where an alternate calculation method is used the facility must submit the method used along with the Baseline Application Form, including a statement on the uncertainty associated with the calculation method and evidence that the use of the alternate proposed method resulted in an emissions estimate of higher accuracy. Alberta Environment

encourages the development of sector-specific calculation methodologies and further refinement of the below calculation methods.

The calculation methods used must be consistent across all baseline years for the facility to ensure that changes in the quantities of greenhouse gas emissions for a facility between years are actual changes in the quantities of greenhouse gases released and not the result of changes in methods used to calculate/estimate the facility's emissions.

Facilities must use the same calculation methods for the Baseline Application and the annual Compliance Reports. A change in the methods used may be warranted due to changes in operation, sources or other factors. In this case, the change in method and the reason for the change must be disclosed in the annual submission. Please note that in some cases the baseline emission intensity may have to be restated.

Table 4: Emission Calculation Methods Acceptable to Alberta Environment

Reference	Method	Stationary Fuel Combustion	Industrial Process	Fugitive	Biomass Combustion	Other (incl. Flaring and Venting, Mobile)
1	EC Sector-Specific Guidance	✓	✓			✓
2	CAPP 2005[1]	✓	✓	✓		✓
3	CAPP 2003[2]	✓	✓	✓		
4	CAPP 1999[2]	✓	✓			
5	SGA 2000[2]	✓				
6	CSA 2007	✓		✓	✓	✓
7	ICFPA 2005a[2]	✓	✓		✓	✓
8	ICFPA 2005b[2]	✓	✓		✓	✓
9	US EPA AP 42[2]	✓				
10	API 2004[2]	✓	✓	✓		✓
11	GRI-GLYCalc[2]			✓		
12	GHG Protocol	✓	✓		✓	✓

1. Environment Canada, 2003, 2004, *Sector-Specific Guidance Manuals and Protocols (Aluminium Production, Base Metals Smelting/Refining, Cement Production, Primary Iron and Steel Production, Lime Production, Primary Magnesium Production and Casting, Metal Mining)*, www.ec.gc.ca/pdb/ghg/guidance/calcu_pro_e.cfm, accessed June 14, 2007.

2. Canadian Association of Petroleum Producers (CAPP) and Clearstone Engineering, 2005, *A National Inventory of Greenhouse Gas (GHG), Criteria Air Contaminant (CAC) and Hydrogen Sulphide (H2S) Emissions by the Upstream Oil and Gas Industry, Volume 3 Methodology for*

[1] These methods (or predecessors) were included in the 2003 Specified Gas Reporting Standard.

Greenhouse Gases [2005-0013] and *A National Inventory of Greenhouse Gas (GHG), Criteria Air Contaminant (CAC) and Hydrogen Sulphide (H2S) Emissions by the Upstream Oil and Gas Industry, Volume 5, Compendium of Terminology, Information Sources, etc. [2005-0015]*, www.capp.ca/default.asp?V_DOC_ID=763&SubjectID=414802, accessed June 14, 2007.

3. Canadian Association of Petroleum Producers (CAPP) and Atlus Environmental Engineering Ltd, 2003, *Calculating Greenhouse Gas Emissions [2003-0003]*, www.capp.ca/default.asp?V_DOC_ID=763&SubjectID=414802, accessed June 14, 2007.

4. Canadian Association of Petroleum Producers (CAPP) and Atlus Engineering Ltd., 1999, *CH_4 and VOC Emissions from the Canadian Upstream Oil and Gas Industry – Volume 3 [1999-0011]*, www.capp.ca/default.asp?V_DOC_ID=763&SubjectID=414802, accessed June 14, 2007.

5. SGA Energy Limited, 2000, *Emission Factors and Uncertainties for CH_4 and N_2O from Fuel Combustion*, www.sgaenergy.com/Experience/PE23.htm, accessed June 14, 2007.

6. Canadian Standards Association, 2007, *Canadian GHG Challenge Registry Guide to Entity & Facility-Based Reporting*, www.ghgregistries.ca/assets/pdf/Challenge_Guide_E.pdf, accessed June 14, 2007.

7. The International Council of Forest and Paper Associations (ICFPA), 2005, *Calculation Tools for Estimating Greenhouse Gas Emissions from Wood Product Facilities*, www.wbcsd.org/web/projects/forestry/Pulp-and-Paper-Tool-Guidance.pdf, accessed June 14, 2007.

8. The International Council of Forest and Paper Associations (ICFPA), 2005, *Calculation Tools for Estimating Greenhouse Gas Emissions from Pulp and Paper Mills*, www.wbcsd.org/web/projects/forestry/Pulp-and-Paper-Tool-Guidance.pdf, accessed June 14, 2007.

9. United States Environmental Protection Agency (US EPA), 1995 - 2007, *Compilation of Air Pollutant Emission Factors (AP 42) and supplements and updates*, www.epa.gov/ttn/chief/ap42/, accessed June 14, 2007.

10. American Petroleum Institute (API), 2004, *Compendium of Greenhouse Gas Emissions Estimations Methodologies for the Oil and Gas Industry*, www.api.org/ehs/climate/new/upload/2004_COMPENDIUM.pdf, accessed June 14, 2007.

11. Gas Technology Institute (GTI), 2000, *GRI-GLYCalc Glycol Dehydrator Emission Estimation Software*, www.gastechnology.org/webroot/app/xn/xd.aspx?it=enweb&xd=10abstractpage\12352.xml, accessed June 14, 2007.

12. World Business Council for Sustainable Development (WBCSD)/World Resources Institute (WRI), 2001 - 2007, *Calculation Tools*, www.ghgprotocol.org/templates/GHG5/layout.asp?type=p&MenuId=OTAx, accessed June 14, 2007.

5.0 Determining Whether the Facility is Subject to the *Regulation*

5.1 Threshold Calculation

The following equation shall be used to determine whether a facility's total direct emissions exceeded the 100,000 tonne of CO_2e threshold:

$$\textit{Total Emissions} = \sum_{i=1}^{n} (E_{CO_2 i} \times GWP_{CO_2}) + \sum_{i=1}^{n} (E_{CH_4 i} \times GWP_{CH_4}) + \sum_{i=1}^{n} (E_{N_2O i} \times GWP_{N_2O}) +$$

$$\sum_{v=1}^{m} (E_{PFC_v} \times GWP_{PFC_v}) + \sum_{v=1}^{m} (E_{HFC_v} \times GWP_{HFC_v}) + (E_{SF_6} \times GWP_{SF_6})$$

Where,

"i"	is a particular source category;
"v"	is a particular PFC or HFC species;
"n"	is the number of source categories;
"m"	is the number of species.
E_{CO2}	is the direct emissions of CO_2, in the calendar year, measured in tonnes for each source category; *(Note: CO_2 emissions from the combustion of biomass and CO_2 emissions from aerobic decomposition of waste are included in determining whether the facility exceeded the 100,000 tonne CO_2e threshold but are not included in the calculation of the Baseline Emissions Intensity (BEI) for the facility).*
GWP_{CO2}	is the global warming potential of CO_2: 1;
E_{CH4}	is the direct emissions of CH_4 in the calendar year, measured in tonnes for each source category;
GWP_{CH4}	is the global warming potential of CH_4: 21;
E_{N2O}	is the direct emissions of N_2O in the calendar year, measured in tonnes for each source category;
GWP_{N2O}	is the global warming potential of N_2O: 310;
E_{PFC}	is the total of industrial process emissions and industrial product use emissions restricted to PFC species, in the calendar year, measured in tonnes;
GWP_{PFC}	is the global warming potential of PFC species as set out in Table 1.

E_{HFC} is the total of industrial process emissions and industrial product use emissions restricted to HFC species, in the calendar year, measured in tonnes;

GWP_{HFC} is the global warming potential of HFC species listed in Table 1

E_{SF6} is the total of industrial process emissions and industrial product use emissions restricted to SF_6, in the calendar year, measured in tonnes;

GWP_{SF6} is the global warming potential of SF_6: 23900;

5.2 Voluntary Reporting

The *Specified Gas Emitters Regulation* applies only to facilities whose total direct emissions are equal to or greater than 100,000 tonnes (or 100 kt) of CO_2e in a year. Facilities that do not meet this threshold but still wish to report their greenhouse gas emissions may do so under the *Specified Gas Reporting Program*. More information on this program is available on the Alberta Environment Greenhouse Gas Reporting Website at: http://www3.gov.ab.ca/env/air/EMR/sgreporting.html

Facilities that do not meet the 100 kt threshold but wish to participate in reducing their greenhouse gas emissions may do so by creating an emissions offset. Reductions generated by an emissions offset project may be sold to facilities subject to the *Regulation*.

5.3 Calculating Total Annual Emissions (TAE)

Total annual emissions are defined in the *Regulation* as the total direct emissions in a year, not including industrial process emissions. In addition for the purpose of calculating TAE for the Baseline Emissions Intensity the determination of the emissions from the CO_2 from the Combustion of Biomass and CO_2 emissions from the Aerobic Decomposition of Waste source categories are set to zero.

The Third Party Auditor is required to verify that the sources, various units and emissions factors used are appropriate for the facility and that the calculation of total annual average emissions, including any unit conversions for the facility have been completed in a reasonable and technically defensible manner.

5.4 Calculating Production

Production is defined in the *Regulation* as the quantity, expressed in the applicable unit of production, of

(i) end product produced by a facility, or

(ii) any input, output or other thing specified under subsection (4) of the *Regulation*.

Subsection (4) of the *Regulation* states that:

> *If a facility* ***does not*** *produce an end product, the director may specify an input, output or other thing as the standard of measurement of production of the facility for the purposes of this Regulation.*

Facilities must include all major production items associated with the release of greenhouse gas emissions. All units of production must be specified in the *International System of Units (SI units)*. Facilities must use the units of production appropriate for their operation and that are widely accepted by the industry to which the facility belongs.

The Third Party Auditor is required to verify that the production items used are appropriate for the facility and that the calculation of total annual production, including any unit conversions for the facility, has been completed in a reasonable and technically defensible manner.

5.5 Calculation of Baseline Emissions Intensity

The baseline emissions intensity for a facility subject to the *Regulation* is calculated by dividing total annual greenhouse gas emissions (TAE) by the annual production of the facility.

Note: The total annual greenhouse gas emissions (TAE) used for the determination of the baseline intensity does not include emissions from Industrial Process. Also, CO_2 Emissions from Combustion of Biomass, and CO_2 Emissions from Aerobic Decomposition of Waste source categories are set to zero.

Established Facility

The baseline emissions intensity (BEI) for an **established** facility is determined by calculating the average of the ratio of total annual emissions (TAE) to Production (P), expressed in the appropriate unit of production, for the years 2003 through 2005, as expressed in the following formula:

$$\mathbf{BEI} = \frac{\left(\frac{\mathbf{TAE}_{2003}}{\mathbf{P}_{2003}} + \frac{\mathbf{TAE}_{2004}}{\mathbf{P}_{2004}} + \frac{\mathbf{TAE}_{2005}}{\mathbf{P}_{2005}} \right)}{3}$$

Where:

BEI is baseline emissions intensity;

TAE is total annual emissions for the year indicated;

P is production for the year indicated

New Facility
The baseline emissions intensity for a new facility must be determined by calculating the ratio of total annual emissions to production for the third year of commercial operation of the facility as expressed in the following formula:

$$BEI = \frac{TAE_3}{P_3}$$

Where:

BEI is baseline emissions intensity;

TAE_3 is total annual emissions for the 3rd year of commercial operation;

P_3 is production for the 3rd year of commercial operation;

The Director may prescribe an alternative method where, on application, the Director determines that the method described above is deemed inappropriate.

6.0 Verification by Third Party Auditor

Note: The following section outlines the framework for the verification of baselines. Based on feedback from some facilities, additional guidance may be required. Work is underway to assess and if necessary, develop this additional guidance. As this will proceed within the context of the verification framework outlined, it should not prohibit facilities from proceeding with the baseline application process.

In accordance with Section 18 of the *Regulation*, a Person Responsible must obtain and submit independent verification of the Baseline Application to Alberta Environment. This section includes information regarding the fundamentals of verification, and content of the Statement of Verification.

The objective of the verification process is to ensure that Alberta Environment receives reports under the *Specified Gas Emitters Regulation*, which are reliable and of sufficient quality to support the determination of the baseline emissions intensity, and support the subsequent compliance assessment. The international norm is to use third parties to provide independent verification of greenhouse gas inventories. Hence, the *Specified Gas Emitters Regulation* also adopted this approach. Alberta Environment retains full discretion with respect to the assessment of submitted Baseline Emission Intensity

Applications and Third Party Auditor Reports. These documents are considered information tools to support the decision to set a baseline emissions intensity.

Alberta Environment has not pre-approved Third Parties qualified to perform verification. Minimum qualifications are specified in the *Regulation* and in this document. The Person Responsible must identify how the Third Party Verifier satisfies the requirements of the *Regulation* and this guidance document in section G of the Baseline Application.

6.1 Verification Fundamentals

6.1.1 Terminology

Greenhouse gas literature and guidance tends to use the term *Verification* to describe the process whereby an objective third party examines or reviews an assertion such as a submission to a regulator and provides an opinion or conclusion. Accordingly Alberta Environment has used the term Verification in its Regulations. However, the technical literature on Audit and Audit related processes uses the term *Assurance* to encompass and define a range of different levels of Assurance where an assurance practitioner is engaged to issue a written communication expressing a conclusion concerning a subject matter for which the accountable party is responsible.

Note: For the purpose of this document Third Party Auditor (Verification Body) is defined as a qualified person or persons that make up the verification team. The lead auditor must sign the Statement of Qualification whereas the Statement of Verification may be signed by any individual provided they have delegated powers to accept legal responsibility for the information provided.

6.1.2 Level of Assurance

There is a wide spectrum of assurance that can be provided depending on circumstances. However, in practice, there are two basic types of conclusions that can be provided through an assurance service: **Reasonable and Limited**.

The highest level of assurance is known as reasonable. This is also known as positive assurance because the conclusion reached is structured as a direct factual statement expressing the opinion of the assurance practitioner. The assurance practitioner provides a high, though not absolute, level of assurance by designing procedures so that in the assurance practitioner's professional judgment, the risk of an inappropriate conclusion is reduced to a low level through procedures such as inspection, observation, enquiry, confirmation, recalculation, re-performance and analytical procedures. Use of the term "high level of assurance" refers to the highest reasonable level of assurance an assurance practitioner can provide concerning a subject matter. Absolute assurance is not attainable as a result of factors such as the use of judgment, the use of testing, the inherent

limitations of control and the fact that much of the evidence available to the assurance practitioner is persuasive rather than conclusive in nature. Assurance will also be influenced by the degree of precision associated with the subject matter itself.

A moderate level of assurance is known as limited. This is also known as negative assurance because the conclusion is based on the identification of anomalies rather than the confirmation of the assertion. Typically, this is worded "Based on our work described in this report, nothing has come to our attention that causes us to believe that the GHG statement is not, in all material respects, in accordance with the approved quantification protocols." The technical literature suggests that limited level assurance can often be obtained through enquiry, analytical procedures and discussion. In the case of GHG assurance, it is unlikely that these procedures alone will be sufficient to acquire sufficient and appropriate evidence upon which the Auditor can come to a conclusion, and additional data systems evaluation and data testing will be required.

As a consequence, the procedures applied in GHG limited assurance engagements are more extensive than what is encountered in financial limited assurance engagements (as illustrated by the suggested limited assurance procedures in Section 6.3.3) but are not as rigorous so as to constitute reasonable assurance. The level of effort required to complete a verification increases with the level of assurance.

Alberta Environment requires that a limited level of assurance be provided for the Baseline and Annual submissions, therefore the level of effort required is less than under reasonable assurance.

It is recognized that reasonable level of assurance is generally set for the assurance on public financial reports and would be the appropriate level of assurance for the Baseline Emissions Intensity Application as emissions reductions could be traded as financial commodities. However, limited level of assurance was selected in recognition of the likely quality of the 2003-2005 GHG inventories and associated data management systems.

6.1.3 Compilation

A compilation engagement is not an assurance service. Compilations specifically focus on building the submission and would result in the auditor reviewing their work. This would be a breach of independence. Please refer to Section 6.1.4.

6.1.4 Independence

Independence is a surrogate measure for objectivity of the auditor and is a key qualification of a Third Party Auditor. The Third Party Auditor must be able to demonstrate independence and must have the appropriate systems in place to document this independence in order to be qualified to undertake a third party verification. There

are five threats to independence that an auditor must assess before accepting a verification contract.

1. Self-interest threat: This occurs when the auditor or a member of the verification team or a person in the chain of command for the verification could directly benefit from a financial interest in the verification client, or when there is any other self-interest conflict with respect to the verification client. For example:

    - Owning shares of the verification client;
    - Having a close business relationship with the client;
    - Contingent fees relating to the results of the engagement;
    - Potential employment with the verification client; or
    - Undue concern about the possibility of losing the verification or other fees from the client.

2. Self-review threat: This occurs when a member of the verification team could be in a position of reviewing his or her own work. For example:

    - Involvement of the verification organization in the compilation of the data contained in the GHG assertion.
    - A verification organization member performing non-verification services that directly impinge on the client's GHG assertion, such as implementing the GHG data management system; and
    - A member of the verification engagement team having previously been a GHG data compiler of the verification client or who was employed by the verification client in a position to exert direct and significant influence over the client's GHG assertion being reviewed.

3. Advocacy threat: This occurs when a verifying organization or a member of the verification team, or a person in the chain of command for the verification, promotes, may be perceived to promote, a verification client's position or opinion to the point that objectivity may, or may be perceived to be, compromised. For example:

    - Dealing in, or being a promoter of, GHG credits on behalf of a verification client; and
    - Acting as an advocate on behalf of the verification client in litigation or in resolving disputes with third parties.

4. Familiarity threat: This occurs when, by virtue of a close relationship with a verification client, its directors, officer or employees, the firm or a member of a verification engagement team becomes too sympathetic to the client's interests. For example:

- A person on the verification team has a close personal relationship with a person who is in a senior GHG compilation role at the verification client; and
- Acceptance of significant gifts or hospitality from the verification client.

5. Intimidation threat or economic dependence— Occurs when a member of the verification team or a person in the chain of command is deterred from acting objectively and exercising professional scepticism by threats, actual or perceived, from the directors, officers or employees of the verification client. For example:

    - The threat of being replaced as Third Party Auditor due to a disagreement with the application of an GHG quantification protocol;
    - Fees from the verification client represent a large percentage of the overall revenues of the Third Party Auditor.
    - The application of pressure to inappropriately reduce the extent of work performed in order to reduce or limit fees; and
    - Threats arising from litigation with a verification client.

6.1.5 Verification Standards

There are standards for the verification that should be adhered to by the auditor. These standards ensure a consistent level of rigour in the verification process such that a peer auditor would come to the same conclusion as the original auditor. The following is a list of appropriate standards for this *Regulation*:

- ISO 14064 Part 3 – Greenhouse Gases: Specification with guidance for the validation and verification of greenhouse gas assertions
- Standards for Assurance Engagements, Canadian Institute of Chartered Accountants (CICA) Handbook – Assurance Section 5025
- International Standard on Assurance Engagements (ISAE) 3000 - Assurance Engagements Other Than Audits or Reviews of Historical Financial Information

6.1.6 Verification Criteria

Verification criteria are the benchmarks or comparison standards to which the auditor compares the GHG assertion, as stated in the Baseline Intensity Application, and supporting evidence. It includes, as appropriate:

- Alberta Environment: *Climate Change and Emissions Management Act*
- Alberta Environment: *Specified Gas Emitters Regulation*
- Alberta Environment: *Technical Guidance Document for Baseline Emission Intensity Applications*
- Other criteria as directed or required by Alberta Environment.

6.1.7 Materiality

Materiality is a concept that refers to an error, omission or misrepresentation that would affect the GHG assertion as stated in the Baseline Intensity Assessment and could influence Alberta Environment's decisions with respect to the baseline emissions intensity. Where an uncorrected material error, omission or misrepresentation arises in the verification, the Third Party Auditor would be unable to provide a verification report that provides assurance over the Baseline Emissions Intensity Application. There are two types of materiality:

a) Qualitative materiality – referring to errors, omissions or misrepresentations of a non-numerical nature e.g.: misleading presentation of circumstances.

   Determining whether a qualitative materiality discrepancy has occurred is at the professional judgement of the Third Party Auditor.

b) Quantitative materiality - referring to errors, omissions or misrepresentations of a numerical nature. Inaccuracies in the input data, omission of sources or inappropriate application of the calculation methodology.

   Quantitative discrepancies are considered material by Alberta Environment if they exceed 5% of the total reported GHG emissions and/or production. For implementation purposes, verifiers may choose a initial materiality level lower than 5% to ensure that they identify individual quantitative discrepancies that aggregate to a material discrepancy.

   Decisions regarding materiality should be made and documented for both the aggregate and disaggregate errors, omissions or misrepresentations with attention to the sensitivity of the variables in question.

All discrepancies (including non-material discrepancies) should be documented (where applicable) in the Third Party Auditor's Report.

6.2 Qualifications of the Third Party Auditor

In addition to the qualification requirements specified in the *Regulation*, criteria to assess the qualifications of a Third Party Auditor are provided in *ISO 14065 Greenhouse Gases – Requirements for Greenhouse Gas and Verification Bodies for use in Accreditation or other Forms of Recognition* (ISO 2007). Alberta Environment suggests that ISO 14065 be consulted as guidance for the Person Responsible for assessing qualifications of Third Party Auditors (verification bodies) the reporter is considering to engage. It is general practice that the Third Party Auditor will select a verification team consisting of several team members, each having specialized areas of expertise (competency), to conduct the verification.

It is important that the verification team have competency in the following areas:

- Data audit practices and data verification standards
- Detail knowledge of the *Specified Gas Emitters Regulation* and associated requirements
- Verification criteria and their appropriate application within the defined scope of the verification
- Technical expertise for the sector the audit team plans to operate in including:
  - The specific GHG activity and technology
  - Identification and selection of GHG sources, sinks, reservoirs
  - Quantification, monitoring and reporting, including relevant technical and sector issues
  - Situations that may affect the materiality of the GHG assertion, including typical and atypical operating conditions.

The Third Party Auditor should have the necessary infrastructure for it to operate as a business including, policies, finances, and quality review of products or services. In particular, there should be processes for:

- tracking independence and identifying independence issues,
- training personnel in verifications,
- assigning appropriate personnel to verification teams,
- storage and retention of working papers,
- assessing the verification process and conclusions,
- issuing verification statements and controls over the signature, and
- resolving appeals or complaints.

6.3 Verification Process

The verification process can be divided into four consecutive steps, pre-verification arrangements, planning, executing, and completing the verification.

6.3.1 Engaging a Third Party Auditor

It is the responsibility of the Person Responsible to initiate the verification by completing the Baseline Emissions Intensity Application and engaging a Third Party Auditor (verification body) to conduct the verification of the application. Figure 2 outlines a suggested process for engaging a Third Party Auditor. It is the responsibility of the Person Responsible to pay for the verification.

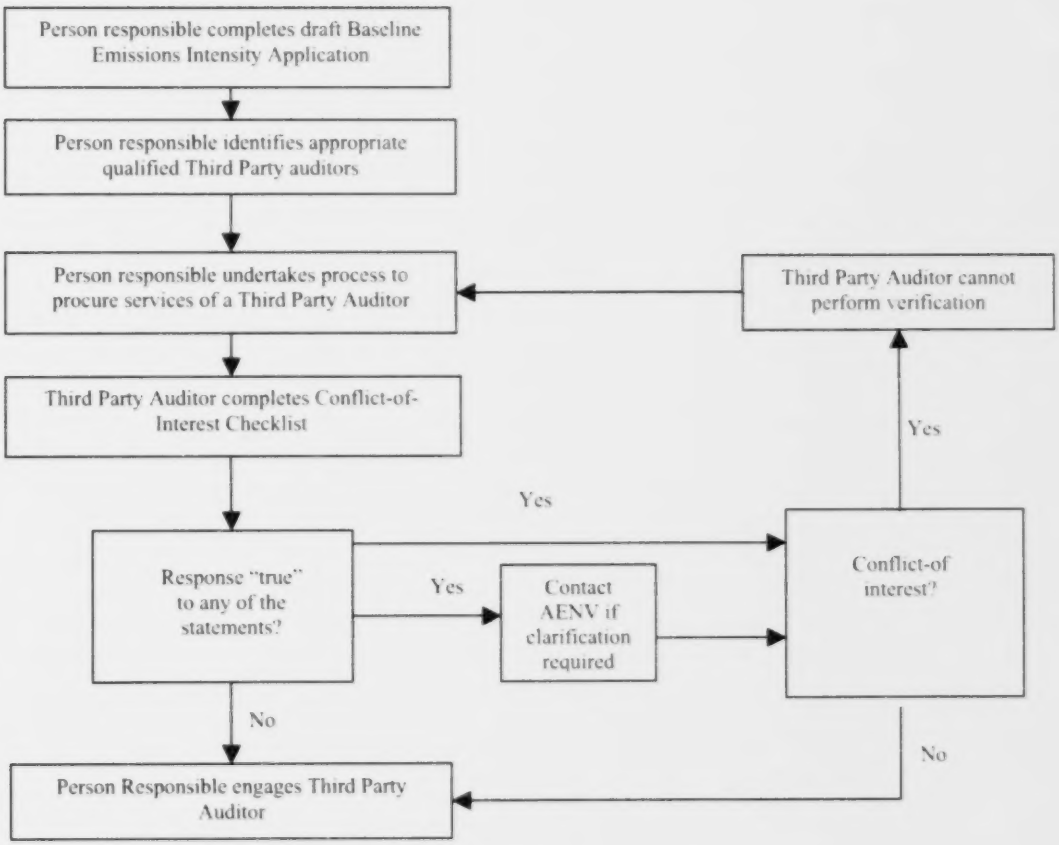
Person responsible completes draft Baseline Emissions Intensity Application
Person responsible identifies appropriate qualified Third Party auditors
Person responsible undertakes process to procure services of a Third Party Auditor
Third Party Auditor cannot perform verification
Third Party Auditor completes Conflict-of-Interest Checklist
Yes
Yes
Response "true" to any of the statements?
Yes
Contact AENV if clarification required
Conflict-of interest?
No
No
Person Responsible engages Third Party Auditor

Figure 2: Suggested Process for Engaging a Third Party Auditor.

Once the Person Responsible has identified the Third Party Auditors suitable to conduct the verification, the Person Responsible implements its normal procurement processes to enter into a contract with the Third Party Auditor. However, in the procurement process both the Person Responsible and the potential Third Party Auditor need to confirm that there are no actual or perceived conflicts-of-interest which may comprise the impartiality of the Third Party Auditor prior to the signing of the contract. The Conflict-of-Interest Checklist (COI) should be filled out as part of the procurement process and will be submitted to AENV along with the Verification Report. Please note that where a Third Party Auditor is utilising external resources on its verification team, a separate Conflict-of-Interest Checklist must be submitted for all the external resources as well as the Third Party Auditor.

Where an engagement or relationship between the person responsible and the Third Party Auditor poses a potential threat to conflict-of-interest, and the person responsible wishes to pursue engaging this Third Party Auditor, written evidence will need to be provided to

AENV that the proposed actions to manage that conflict are adequate to preserve actual and perceived independence. AENV will assess all potential conflict-of-interests cases.

If a potential conflict-of-interest is a sufficient perceived or actual threat to impartiality or cannot be effectively managed, a verification conducted by that Third Party Auditor will not be acceptable to Alberta Environment.

The Third Party Auditor must monitor impartiality over the duration of the verification and any identified actual or potential conflict-of-interest situations must be communicated to the Person Responsible and AENV must be notified.

The following is a checklist of terms that should be addressed in a contract:

- The objective of the verification
- To whom assurance is being provided (i.e., Government of Alberta)
- What level of assurance is being provided (i.e., limited)
- Which standards to which the assurance will be provided
- Which verification criteria will be used in the verification
- Scope of the verification (project description including gases, location, temporal aspects)
- Verification team members and their roles
- Confidentiality clause

After there is agreement on the contract and all legal documents have been appropriately signed off, the auditor must gain an understanding of the client's facility, GHG data and GHG data management systems; and obtain the client's draft Baseline Emissions Intensity Application so that the auditor can design and execute an effective and economical verification.

6.3.2 Planning the Verification

Once the Third Party Auditor has been selected and engaged by the Person Responsible (PR) the planning phase of the verification begins. In planning the verification, the Third Party Auditor must:

1. Set the objectives of the verification.
2. Assess the potential risks in the GHG data management system by
    a. Assessing the inherent and control risk associated with GHG data and data management system to determine areas for further investigation.
    b. Performing analytical testing on the draft GHG assertion to determine areas for further investigation.
3. Assess the potential magnitude of any errors, omissions and misreporting by conducting a magnitude and sensitivity analysis on the reported data to determine parameters that significantly effect the GHG assertion.

4. Set an initial quantitative materiality level for any errors, omissions or misreporting.
5. Design and document a verification plan and sampling plan that details which verification procedures should be applied to meet the objectives of the verification.

The over-arching objective of the verification is to express a conclusion on the plausibility of the GHG assertion. The GHG assertion is typically a declaration or factual and objective statement made the by Person Responsible with respect to actual performance, events or circumstances. Verification procedures can be aligned with these characteristics to ensure that they are designed appropriately. General verification procedures consist of computation, observation, confirmation, enquiry, inspection, and analysis. The verification plan should show the linkages between the verification objectives, risks, magnitude of errors, anomalies, materiality, and procedures. The verification plan should also take into consideration the management of the GHG data as this determines the control risk for the next verification.

For example, a common objective is to determine whether the GHG inventory is complete. The risk of the inventory being incomplete will be unknown if this is the first time the auditor has seen the procedures the client has applied to ensure the completeness of the GHG inventory. The potential magnitude of the errors, omissions and misreporting depends on the GHG source type but could be greater than the initial quantitative materiality levels. The verification procedures are:

1.) Inspect the site to confirm the GHG inventory.
2.) Inquire as to how the client ensures that the GHG inventory is complete.

Figure 3 provides an overview of the planning process with further details on each step following Figure 3.

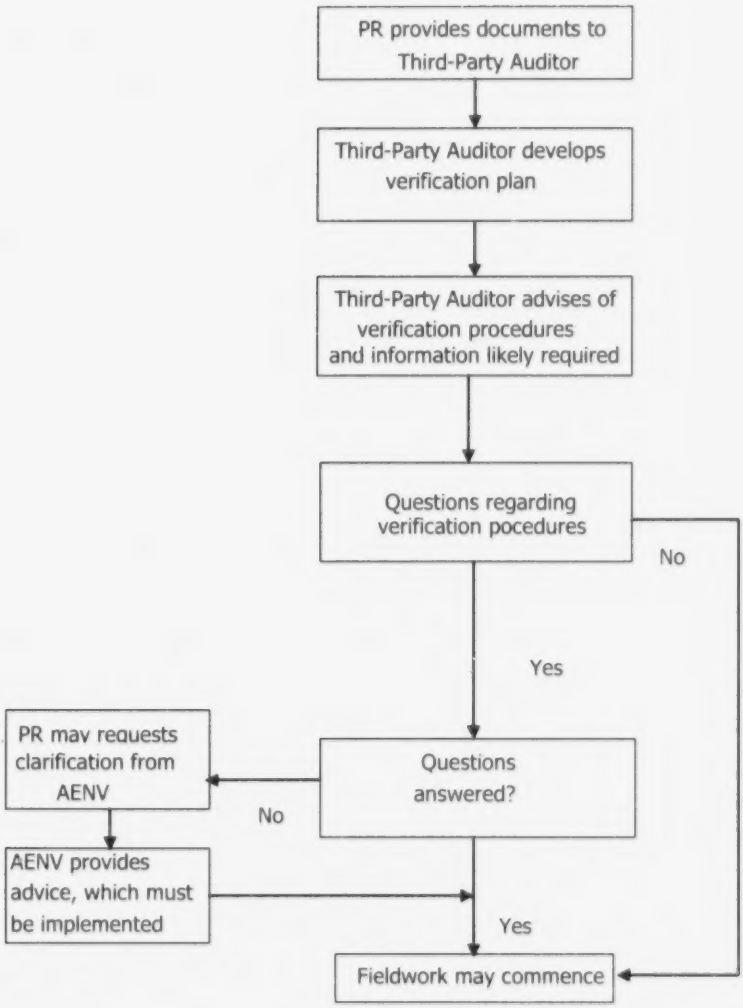

Figure 3: Verification Planning Process.

Person Responsible (PR) provides documents to Third Party Auditor
In order for the Third Party Auditor to effectively plan the verification, the Person Responsible must provide sufficient information to allow the Third Party Auditor to evaluate the audit risk[2] and assess potential sources of errors, omissions or misrepresentations. This information includes the Baseline Emissions Intensity Application document, and, generally, a description of the site process, an inventory of GHG sources and a brief description of the GHG data management system and the quantification protocol used to calculate the GHG emissions. Other documents will vary according to the specific application being verified, however, these are likely to include any information supporting the quantification of GHG emissions and production.

The Third Party Auditor is responsible for clearly communicating to the Person Responsible the specific type of information required.

The Person Responsible should be aware that the more prepared they are for the verification (in terms of the collation of documents and records) the easier and often less expensive, the verification will be.

Third Party Auditor develops Verification Plan
In order to conduct the verification, the Third Party Auditor needs to develop two planning documents: a verification plan and a sampling plan. The verification plan documents the terms of the engagement and the potential verification procedures. The verification procedures originate from anomalies encountered in the preliminary testing and the identification of risks. The sample plan is a type of verification procedure. It is generally developed at the site when the granularity of the data and the existence of certain records become known.

Verification Plan
The verification plan documents the terms of the engagement and the potential verification procedures. The verification procedures originate from anomalies encountered in the preliminary testing and the identification of risks. The verification plan documents includes information, such as:

- verification objectives,
- level of assurance,
- scope,
- verification criteria,
- verification standards,
- verification team,

[2] Audit risk is the likelihood that the auditor will reach the wrong opinion on the GHG assertion which is being verified. Audit risk is a function of:

- *Inherent risk* - the likelihood of a material error, omission or misrepresentation based on the complexity of the project
- *Control risk* - the likelihood the person responsible's control procedures will fail to prevent, detect or correct an error or omission.
- *Detection risk* - the probability that an auditor will not find a materiality discrepancy.

- draft verification schedule
- draft sampling plan
- results of risk and magnitude assessments,
- results of the preliminary quantitative testing,
- initial quantitative materiality levels,
- draft verification procedures, and
- documentation retention requirements.

Detailed guidance on the development of a verification plan is provided in annex clause A.2.4 of ISO14064: Part 3.

One important aspect of the verification plan is the selection of the verification team that will execute the verification activities. Please note, while Third Party Auditors may hire-in expertise, which may be absent from their company, the outsourcing of verification activities is not permitted. External resource personnel:

- Must be integrated into the verification team under the supervision of the lead auditor.
- Must comply with the requirements for impartiality and conflict-of-interest requirements.
- Must follow the procedures and methodologies of the Third Party Auditor; and
- Should execute no more than 20% of the hours scheduled to complete the verification.

The preparation and sign off of the Third Party Auditor's Report remains the responsibility of the Third Party Auditor and may not be outsourced.

Sampling Plan

The sampling plan is a subset of the verification plan and describes the amount and type of evidence that the Third Party Auditor requires in order to issue a positive verification opinion. The sampling plan is based on the level of assurance required (in this case limited) and the risk of encountering a discrepancy in the GHG data. Sampling is conducted when other verification procedures are insufficient or when it is the most efficient and effective method to investigate an anomaly or confirm the data. As it is impossible for the Third Party Auditor to examine every record to support the data in the Baseline Emissions Intensity Application., the sampling plan sets out the number and type of records to be examined, and methodology used to determine the sample and a justification for this.

Third-party auditors will use a combination of a risk-based approach (i.e. where error, omissions or misrepresentation are most likely to arise or have the greatest impact) and statistical approach. The risk-based approach is the predominant selection method for efficiency purposes. Detailed guidance on the development of a verification plan is provided in annex clause A.2.4 of ISO14064: Part 3, clause 4.3.3.

In practice this could mean, for example, for data that have been previously submitted to another Alberta registry, which has equivalent or better verification requirements (i.e. annual audit of the data through third-party auditor), and evidence can be provided that the data under consideration was audited, these data are less likely to be erroneous, therefore have a lower risk associated with them, and will not likely be the focus of a sampling plan.

Third Party Auditor Communication with the Person Responsible
It is the Third Party Auditor's responsibility to properly communicate the likely verification procedures that could occur during and after the field visit and the tentative schedule. This communication is a joint discussion, as it requires information from the Person Responsible as to the availability of information and personnel to determine an appropriate time and location to collect the necessary evidence.

The design of the verification procedures in a limited assurance engagement originates from anomalies noted in the preliminary analysis and areas of risk identified through the risk and magnitude assessments. These verification procedures change during the project as new evidence is provided and assessed. As a consequence, the verification and sample plan is in flux until sufficient and appropriate evidence has been provided to explain the anomalies and there is confirmation that areas of risk in the data management system have not created material discrepancies in the Baseline Emission Application. Once an anomaly has been sufficiently and appropriately explained, further verification procedures to investigate this anomaly are not required. Once sufficient and appropriate evidence has been provided that risk has not resulted in a material discrepancy, further verification procedures to investigate this risk are not required.

If there is a concern by the Responsible Party that the verification procedures are not appropriate (i.e., either not sufficient or too rigorous), the Third Party Auditor should be able to justify the verification procedures through a linkage to the anomaly or area of risk in the data management system; and the assessment of the quality of evidence provided.

If there is disagreement as to the appropriateness of the verification procedures after the explanation, AENV may be contacted and will assess the verification procedures and the supporting evidence, and make a decision on the appropriateness of the verification procedures. If required, the Third Party Auditor must amend the verification procedures as instructed by AENV. It is the responsibility of the Person Responsible to cover the costs of any required amendments.

During the execution of the verification, issues may arise that may warrant amendments to the verification and sampling plans. Third Party Auditors must continually monitor the appropriateness of their verification plans and make any required modifications.

Commencement of fieldwork
Upon completion of the preliminary assessment, drafting of the verification plan and the communication of the likely verification procedures to the Responsible Party, the fieldwork may commence.

6.3.3 Executing the Verification

The execution of the verification consists of applying the procedures developed in the verification plan. Table 5 provides examples as to the procedures that could be applied in a verification.

Please note that this table is for illustration only and completion of these procedures would not constitute verification procedures, as each facility should have verification procedure designed for their unique situation. This is not an exhaustive listing of possible assurance procedures.

Table 5: Example Verification Procedures.

Type	Example
Computation	Compute the emissions to corroborate clients calculations
Observation	Observe the login procedures to corroborate security of the data
Confirmation	Confirm that production was delivered by contacting the consumer
Enquiry	Enquire client personnel as to emissions management
Inspection	• Inspect the site to corroborate GHG inventory (sources and sinks, measured parameter, measurement technology, technology enhancements) • Inspect maintenance records to corroborate measurement accuracy and operation • Inspect calculations to corroborate conformance to verification criteria • Inspect manufacturer's specification to corroborate efficiencies, accuracies and/or limitations • Inspect spreadsheet calculation to corroborate the correct application of the verification criteria (e.g., quantification methodologies) and conversion factors • Inspect lab records to corroborate fuel composition
Analysis	Analysis of history of production and emissions

Verification procedures are designed to source out the cause of any data anomalies and ensure risks posed by the data management system do not result in material discrepancies. There are typically several verification procedures that could be applied to investigate one anomaly or risk. The verifier should use professional judgement as to when sufficient and appropriate evidence has been collected to explain the anomaly or alleviate concerns about data management risks. When sufficient and appropriate evidence has been collect, additional verification procedures that investigate the concern are no longer necessary and can be deleted from the verification or sample plan.

Once the appropriate verification procedures have been applied, the collected evidence must be assessed to determine whether the client's GHG assertion is supported by sufficient and appropriate evidence. The GHG assertion and the supporting evidence are compared against the verification criteria. If the auditor determines that the GHG

assertion is supported by sufficient and appropriate evidence and that it adheres to the verification criteria, then the statement of verification can be drafted and the working papers completed.

Issues arising during the course of the verification
Problems can be encountered in verifications. During the course of the verification it is possible that qualitative and quantitative discrepancies may be identified. The Third Party Auditor needs to form an opinion on whether a discrepancy is material or not. Based on the type of discrepancy, different responses are appropriate:

Immaterial Discrepancies
Where the discrepancy is deemed by the Third Party Auditor to be immaterial, the Third Party Auditor should proceed to finalize the verification. The Third Party Auditor should also communicate any easily corrected immaterial discrepancies to the Person Responsible so that they can make efforts to correct these discrepancies (e.g., transcription or typographical errors) in the Baseline Intensity Application before submission. Uncorrected immaterial discrepancies should be reported in the Third Party Auditor's Report.

Material Discrepancies
Where the discrepancy is deemed by the Third Party Auditor to be material, the third party must communicate the discrepancy to the Person Responsible. Significant efforts must be made by the Person Responsible to correct any material discrepancies. If material discrepancies cannot be corrected in the time required, the Responsible Party must disclose the material discrepancies in the Baseline Intensity Application and the Third Party Auditor should proceed to finalize the verification. If the Person Responsible does not disclose this information in the Baseline Intensity Application, the Third Party Auditor must not issue a statement of verification and must include any material and immaterial discrepancies in the Third Party Auditor's Report. Please note that the Third Party Auditor must not consult (i.e. offer or provide solutions) to the issue; rather the issue should simply be identified to the Person Responsible.

6.3.4 Completing the Verification

The process for completing the verification is illustrated in Figure 4. The outcome of this stage of the verification is a draft Third Party Auditor's Report. This report must be provided to the Person Responsible.

Content of the Third Party Auditor's Report
The Third Party Auditor's report contains the final verification plan and a completed schedule of audit procedures and findings identifying any material and immaterial discrepancies that were not resolved during the verification process. (see table Schedule of Audit Procedures and Findings). This report must be submitted to AENV along with the Baseline Emissions Intensity Application.

Table 6: Schedule of Verification Procedures and Findings

Description of verification criteria	Provide a brief description of verification criteria that must be met
Verification Procedures	Provide a brief description of the verification procedures
Findings	Provide a brief description of the verification finding. All discrepancies must be noted
Conclusion	Provide the opinion on the verification outcome

Please note that in the identification of the discrepancies, the Third Party Auditor must not "consult" that is, play a role in the management of the data or data management system provide advice as to which solutions and/or how to implement solutions to resolve discrepancies. These decisions must be left to the Person Responsible.

The working papers are the backbone of the verification and must be retained and made available to Alberta Environment upon request. This documentation should be reviewed by an authority with the auditor's organization to confirm the quality of the verification and the conclusions from the verification.

Verification working papers typically consist of:

- The signed contract
- A listing of the practitioners involved in the verification
- A risk assessment for the engagement
- The results of the materiality assessment
- The results of the preliminary data analysis
- The verification plan
- Documentation of data management system and controls
- Results of verification procedures
- The team's conclusions
- The Statement of Verification

Closing meeting

Once the draft Auditor's Report has been compiled, the Third Party Auditor will provide the draft report to the Person Responsible. A meeting should be arranged to discuss the report and provide the opportunity for the Person Responsible to clarify any outstanding issues. The Person Responsible and Third Party Auditor should attempt to resolve outstanding issues at the issues meeting.

In any event timelines for the provision of additional information by the Person Responsible should be set in place. In the event that material discrepancies cannot be resolved within the timeframe available the Third Party Auditor must include the

discrepancies in the Third Party Auditor's Report. The Person Responsible is obligated to submit the Third Party Auditor's Report to Alberta Environment with the Baseline Emissions Intensity Application.

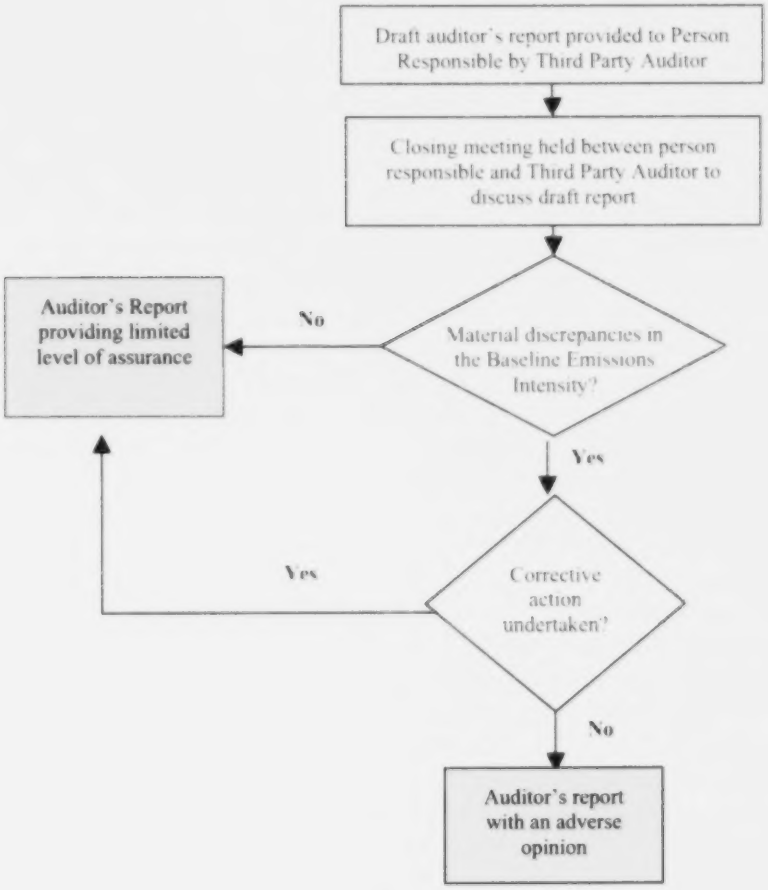
Draft auditor's report provided to Person Responsible by Third Party Auditor
Closing meeting held between person responsible and Third Party Auditor to discuss draft report
Material discrepancies in the Baseline Emissions Intensity?
No
Auditor's Report providing limited level of assurance
Yes
Corrective action undertaken?
Yes
No
Auditor's report with an adverse opinion

Figure 4: Process to Complete the Verification.

6.4 Statement of Verification

For the limited level of assurance there are three possible verification statements that can result from the verification (see Figure 5):

- a limited level assurance statement
- a qualified limited level assurance statement
- an adverse assurance statement

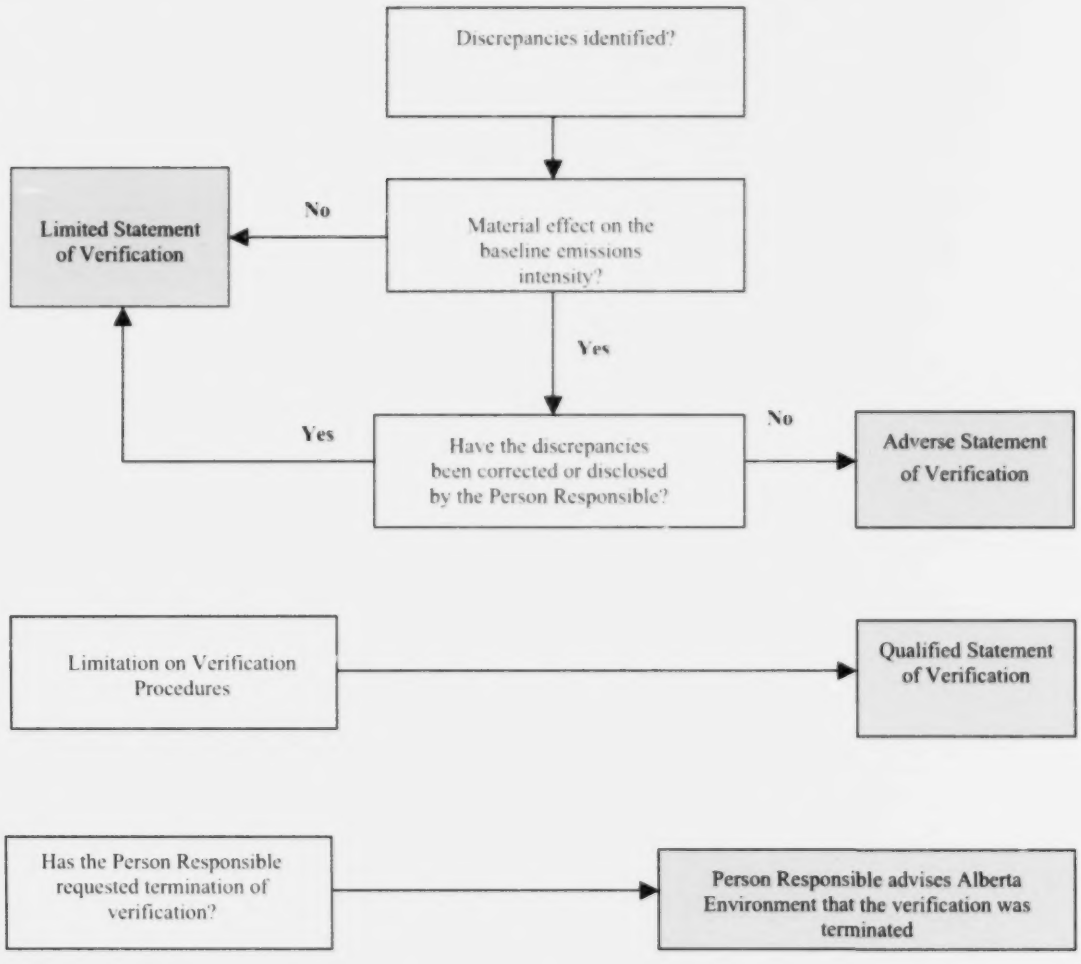
Discrepancies identified?
Material effect on the baseline emissions intensity?
No
Limited Statement of Verification
Yes
Have the discrepancies been corrected or disclosed by the Person Responsible?
Yes
No
Adverse Statement of Verification
Limitation on Verification Procedures
Qualified Statement of Verification
Has the Person Responsible requested termination of verification?
Person Responsible advises Alberta Environment that the verification was terminated

Figure 5: Possible Verification Outcomes.

Limited Level of Assurance - Statement of Verification
This statement of verification is issued by the Third Party Auditor to the Person Responsible if the Third Party Auditor is satisfied that they have undertaken sufficient procedures and there has been sufficient and appropriate evidence supplied to determine that nothing has come to their attention that causes them to believe that the baseline emissions intensity is not fairly stated. This report may be issued despite immaterial discrepancies remaining.

Qualified Limited Level of Assurance - Statement of Verification
A qualified statement of verification is appropriate if the Third Party Auditor is unable to form an opinion on certain aspects of the baseline emissions intensity application due to circumstances beyond the control of the Third Party Auditor and the Person Responsible. Examples include the disposal of records in compliance with regulations or the destruction of records in a natural disaster. Limitations on the scope of the assurance should be clear in the statement of verification and the reasons for the limitation should be disclosed in the Third Party Auditor's Report. The reasons for the limitations should be clearly stated such that Alberta Environment has adequate information to decide on an appropriate course of action. Further guidance is provided in ISO 14064: Part 3, Annex A.2.9.2.

Adverse Assurance – Statement of Verification
Adverse assurance statements are rarely issued, but when they are it is because there are outstanding unresolved and undisclosed material discrepancies.

Verification terminated at the request of the Person Responsible and no Auditor Report or Statement of Verification issued
When faced with an adverse Auditor's Report, the Person Responsible may consider asking the Third Party Auditor not to produce the report and terminate the verification. This may be for a number of reasons including the Person Responsible requiring more time to prepare for the verification. The Person Responsible must inform Alberta Environment upon termination of the verification.

Content of Statement of Verification
A measure of uniformity in the form and content of the Statement of Verification is important because this helps to promote the reader's understanding and to identify unusual circumstances when they occur.

The Statement of Verification should include the following elements:

- identify to whom the report is directed;
- describe the objective of the verification and the entity or portion thereof, the subject matter and the time period covered by the verification;
- identify the GHG assertion;

- describe the responsibilities of management and the auditor;
- identify the applicable standards in accordance with which the verification was conducted;
- identify the criteria against which the GHG assertion and supporting evidence was evaluated;
- state a conclusion that conveys the level of assurance being provided and/or any reservation the auditor may have;
- state the date of the report;
- identify the name of the auditor (or firm); and
- identify the place of issue.

Illustrative Example:

To Alberta Environment,

Scope
We have reviewed the baseline GHG emission intensity presented in Facility A's GHG report (the Report) for the period January 1 2003 to December 31 2005. Facility A's management is responsible for the collection and presentation of the information within the Report. Our responsibility is to express a conclusion as to whether anything has come to our attention to suggest that the baseline GHG emission intensity is not presented fairly in accordance with Alberta Environment's *Specified Gas Reporting Regulation* and associated guidance documents.

Methodology
Our verification was completed in accordance with the International Standard on Assurance Engagements (ISAE) 3000, developed by the International Federation of Accountants. As such, we planned and performed our work in order to provide limited, rather than absolute assurance with respect to the GHG emission intensity information we reviewed. Our verification criteria were based on guidelines approved by Alberta Environment. We believe our work provides a reasonable basis for our conclusion.

Conclusion
Based on our work, nothing has come to our attention that causes us to believe that the GHG emission intensity present in the Report is not presented fairly in accordance with the relevant criteria.

Signature
Auditor
City, Province, Country
Date

The Conclusion paragraph states the opinion of the Third Party Auditor and can change if a qualified or adverse opinion must be rendered.

An example of a qualified opinion is:
Based on our work, there was not sufficient and appropriate evidence to support a conclusion on the baseline emission intensity during the period xx.xx to xx.xx. As referenced in the Baseline Intensity Application, records for this period were unavailable. Readers are cautioned that statements during this period may not be appropriate for their purposes. Based on our work, during the period zz.zz to zz.zz nothing has come to our attention that causes us to believe that the GHG emission intensity presented in the Report for this period is not presented fairly in accordance with the relevant criteria.

An example of an adverse opinion is:
Based on our work, the Baseline Emissions Intensity Application does not contain all the disclosures required by Alberta Environment. Readers are cautioned that these statements may not be appropriate for their purposes.

6.5 Peer Review Process

ISO14064: Part 3 clause 4.8 notes that, ISO14065 and some GHG programs require that a "peer review" be conducted. This peer review requires that persons different from those who undertook the fieldwork (i.e. assessed the GHG Information System and its controls, the GHG data and information and conducted the assessment against the verification criteria) perform the final evaluation of the evidence and conclusions of the verification team. Alberta Environment strongly recommends that this peer review be conducted.

A peer review involves a person, removed from the verification process, evaluating the work of the team. An example of this peer review may include the verification team justifying to another experienced verifier in the company, why verification activities and the evidence collected are adequate to support the conclusions in the draft report. In this scenario the lead verifier may choose to play 'devil's advocate' in order to ensure the rigor of the verification activities is sufficient to provide a reasonable level of assurance.

6.6 Subsequent Events

In certain circumstances, matters may come to the attention of the Third Party Auditor that renders a previously issued Auditor's Report invalid or inaccurate. Third Party Auditors are not required to actively monitor the validity of their reports after issuance. However, where it is brought to the attention of the Third Party Auditor, they must notify the Person Responsible.

When such circumstances arise, the Person Responsible must notify Alberta Environment.

7.0 Completing the Baseline Application

Baseline Application forms are available in Microsoft Excel format on the Alberta Environment Greenhouse Gas Reporting website at:

http://www3.gov.ab.ca/env/air/EMR/sgreporting.html

The Baseline Application form contains seven sections (A-G), two instructions pages and four forms that must be printed and signed. Fill out all sections of the Application as applicable. Enter or check "not applicable" (N/A) for items that do not apply to your facility.

The sections to be completed are:

Section A: Administrative Information
Section B: Emissions, Production and Intensity Information
Section C: Calculation Methods
Section D: Cogeneration Information
Section E: Baseline Calculation
Section F: Additional Comments
Section G: Third Party Auditor Information
Submission of Information
Conflict-of-Interest Checklist
Statement of Qualification
Statement of Verification
Statement of Certification

7.1 Instructions

This section provides assistance with filling out the application form including contact information on where to direct questions regarding the Baseline Application form.

7.2 Section A: Administrative Information

Worksheet A1
Section A: Administrative Information

Facility ID Number
Enter the facility ID number that is used by the facility in the one-window electronic data reporting system (EDR) for reporting of greenhouse gas emissions. This is a six digit alphanumeric ID. It can be found on the most recent submitted Specified Gas Report for the facility. If the facility did not submit using the EDR for 2004, 2005 or 2006 reporting, then it will not have a facility ID and N/A can then be entered in this field.

Facility Name
Enter the facility name that was used in most recent submission under the *Specified Gas Reporting Program*. If the facility name is no longer applicable, then use a more appropriate one.

EPEA Approval/Registration Number(s)
Enter all active EPEA approval or registration numbers that apply to this facility. If the facility does not have an EPEA approval or registration, enter N/A.

EUB License/Registration Number(s)
Enter all active EUB license or registration numbers that apply to this facility. If the facility does not have an EUB license or registration, enter N/A.

NPRI ID(s)
Enter all NPRI ID numbers that apply to the facility. If the facility does not have an NPRI ID, enter N/A.

NAICS
Enter the six-digit North American Industry Classification System number that applies to the facility. It is recommended that the Person Responsible use the NAICS code from their most recently submitted Specified Gas Report. A NAICS search tool is available from Statistics Canada at:
http://www.statcan.ca/english/Subjects/Standard/naics/2002/naics02-menu.htm

Facilities must only enter one NAICS code. Some complex facilities, such as the oil sands facilities, may not precisely fit into one NAICS category. The most appropriate NAICS code for the majority of the activities at the facility should be chosen.

Facility Geographical Coordinates
Enter the geographical coordinates (latitude and longitude in NAD 83) of the facility. Facilities that only have their geographical coordinates in NAD 27 will need to convert them to NAD 83. An online conversion tool is available from Natural Resources Canada to do this conversion. The conversion tool can be found at:
http://www.geod.nrcan.gc.ca/apps/ntv2/ntv2_geo_e.php

Use the centre point of the facility if the facility cannot be identified with one exact point location. There are online tools available that can convert legal land descriptions to latitude and longitude. These tools may be used if it is not feasible to obtain geographical coordinates from another source. Pipeline facilities may pick one point or piece of equipment along the contiguous section of the pipeline operation (such as a compressor station) and use those as the facility's geographical coordinates.

Facility Legal Land Description
Enter the facility's legal land description. Pipeline facilities may enter N/A for their legal land description.

Facility Location
Enter the physical location of the facility.

Facility City/District/Municipality/County
Enter the city/district/municipality/county of the facility; whichever is most appropriate for the facility's location.

Province/Territory
Enter the province/territory of the facility. This should always be Alberta.

Postal Code
Enter the postal code of the facility.

Facility Mailing Address
Enter the facility mailing address; the address may differ from the facility's location.

Mailing Address City/District/Municipality/County
Enter the city/district/municipality/county, whichever is most appropriate for the mailing address of the facility,

Province/Territory
Enter the province/territory of the mailing address of the facility.

Postal Code
Enter the postal code of the mailing address of the facility.

First Year of Commercial Operation
Enter the first year of commercial operation of the facility. New facilities are also required to enter their third year of commercial operation in the *Third Year of Commercial Operation* field.

Number of Years of Continual Operation
Enter the number of years of continual operation of the facility. If the facility has been shutdown for an entire year, then the number of years of continual operation would start after that shutdown year.

Describe the criteria used to determine the first year of commercial operation for this facility
Enter the criteria. Factors to be considered include, but are not limited to, completion of construction, production of output, whether the facility has started receiving feedstock or input, commissioning, the date of operation as stated in the EPEA approval for the facility or other reasonable alternative.

Worksheet A2
Section A: Administrative Information (continued)

Reporter
Enter the first and last name, position/title at the company or facility, telephone and fax numbers, email address, mailing address, city or district or municipality or county (whichever is most applicable), province/territory and postal code of the Reporter (contact at the facility for the Baseline Emissions Intensity Application).

Reporting Company
Enter the reporting company's legal and trade names and the reporting company's business number. The legal and trade names may not be the same. The business number is a nine-digit common identification number provided by the Government of Canada. It is usually found on a company's GST form. Enter the reporting company's mailing address, city or district or municipality or county (whichever is most applicable), province/territory and postal code.

Worksheet A3
Section A: Administrative Information (continued)

Description of the facility's boundaries and operations
Enter a brief description of the facility's boundaries and operations. This should include general information about what the boundaries of the facility are, operations and activities included at the facility, if something is excluded (i.e. power plant - coal from a mine and the emissions associated with the mine are reported by the mine not the power plant) and any other relevant boundary or operational information. If additional space is required, attach an additional document with the submitted Baseline Application, indicating to which section of the Baseline Application the additional information refers.

Worksheet A4
Section A: Administrative Information (continued)

Consultant Information
Enter an "X" if a consultant was not hired to work on / complete the Baseline Application. Enter the contact information for the consultant hired to complete the application or to calculate emissions, production or other information used to complete this application (excluding auditing). Enter the first and last name, professional designation, position/title at the consulting company, telephone and fax numbers, email address, mailing address, city or district or municipality or county (whichever is most applicable), province/territory and postal code.

Worksheet A5
Section A: Administrative Information (continued)

Public Contact
Enter the first and last name, position/title at the company or facility, telephone and fax numbers, email address, mailing address, city or district or municipality (whichever is most applicable), province/territory and postal code for the public contact. If the public

contact is the same as the Person Responsible simply enter an "X" in the Same as Person Responsible box. You are then not required to re-enter the information.

Certifying Official
Enter the first and last name, position/title at the company or facility, telephone and fax numbers, email address, mailing address, city or district or municipality (whichever is most applicable), province/territory and postal code of the Certifying Official. This information will carry forward to the Statement of Certification.

Worksheets A6 and A7
Section A: Administrative Information (continued)

Parent Company Information
Enter an "X" next to each parent company before filling in the required information. Leave the boxes blank if you do not have any additional parent companies. Enter the legal name, percent ownership of the facility, mailing address, city/district/municipality/country (whichever is most appropriate), province/territory and postal code, Business number and DUNS number (if applicable) of each Canadian parent company that owned 10% or more of the facility on July 1, 2007.

The Business Number is a nine-digit common identification number provided by the Government of Canada. It is usually found on a company's GST form. The DUNS (data universal numbering system) number is a nine digit tracking number used by businesses and government to track businesses worldwide. A Company's DUNS number can usually be obtained by contacting the company's financial department.

Note: *Parent company information was reported in previous Specified Gas Reports. Consult your most recently submitted Specified Gas Report for filling out this section and update the information where required.*

7.3 Section B: Emissions, Production and Intensity Information

This section requires the reporting of emissions of the six specified gases (CO_2, CH_4, N_2O, HFC, PFC and SF_6) subject to the *Regulation* by source category or species. This information is then used to calculate the total annual emissions (TAE) for the facility. In addition annual total production information must also be reported. The TAE and production information will be used to calculate the baseline emissions intensity for the facility. The information entered in this section will carry forward throughout the rest of the application.

The application for *established facilities* requires information for the years 2003, 2004 and 2005. The application for *new facilities* requires information for only the third year of commercial operation.

The following applies for the emission fields: if the specified emissions from the specified source do not occur at the facility, enter an "X" in the appropriate N/A box.

Worksheets B1, B1(2) and B1(3)
Section B: Emissions, Production and Intensity Information

Stationary Fuel Combustion Emissions
Enter CO_2, CH_4 and N_2O emissions in tonnes from stationary fuel combustion sources.

Note: *Combustion of Biomass: CO_2 emissions from the combustion of biomass must be reported in a separate source category (CO_2 Emissions from the Combustion of Biomass) and are included in the calculation of the emissions threshold. However, CO_2 emissions from the combustion of biomass are not included in the calculation of the total annual emissions (TAE) for the facility. N_2O and CH_4 emissions from biomass combustion must be reported in the Stationary Fuel Combustion source category and are included in the total annual emissions (TAE).*

Industrial Process Emissions
Enter CO_2, CH_4 and N_2O emissions in tonnes from industrial process sources. Total industrial process emissions in CO_2e are automatically calculated.

Note: *Industrial process emissions are included in the calculation of the emissions threshold. However, industrial process emissions are not included in the calculation of the total annual emissions (TAE) for the facility.*

Venting Emissions
Enter CO_2, CH_4 and N_2O emissions in tonnes from venting sources.

Flaring Emissions
Enter CO_2, CH_4 and N_2O emissions in tonnes from flaring sources.

Other Fugitive Emissions
Enter CO_2, CH_4 and N_2O emissions in tonnes from other fugitive sources.

On-site Transportation Emissions
Enter CO_2, CH_4 and N_2O emissions in tonnes from on-site transportation sources.

Waste and Wastewater Emissions
Enter CO_2, CH_4 and N_2O emissions in tonnes from waste and wastewater sources

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Note: *CO_2 Emissions from the aerobic decomposition of waste are included in the calculation of the emissions threshold but are not included in the calculation of the total annual emissions (TAE) for the facility. CH_4 and N_2O emissions from the aerobic decomposition of waste are included in the waste and wastewater source category.*

Vented Raw Gas Emissions
Enter CO_2 emissions in tonnes from vented raw gas sources.

Worksheets B2, B2(2) and B2(3)
Section B: Emissions, Production and Intensity Information (continued)

Hydrofluorocarbon (HFC) Emissions
Enter hydrofluorocarbon emissions from industrial product use sources for each of the specified HFC species in tonnes. Total HFC from industrial product use in CO_2e is automatically calculated. Enter hydrofluorocarbon emissions from industrial process sources for each of the specified HFC species in tonnes. Total HFC from industrial process in CO_2e is automatically calculated.

Worksheets B3, B3(2) and B3(3)
Section B: Emissions, Production and Intensity Information (continued)

Perfluorocarbon (PFC) Emissions
Enter perfluorocarbon emissions from industrial product use sources for each of the specified PFC species in tonnes. Total PFC from industrial product use in CO_2e is automatically calculated. Enter perfluorocarbon emissions from industrial process sources for each of the specified PFC species in tonnes. Total PFC from industrial process in CO_2e is automatically calculated.

Sulphur Hexafluoride (SF_6) Emissions
Enter sulphur hexafluoride emissions from industrial product use sources and enter sulphur hexafluoride emissions from industrial process sources in tonnes.

Total HFC, PFC and SF_6 Emissions
Total HFC, PFC and SF_6 emissions in tonnes CO_2e from industrial product use and industrial process are brought forward using previously entered data. Total HFC, PFC and SF_6 emissions in tonnes CO_2e are automatically calculated.

Worksheets B4, B4(2) and B4(3)
Section B: Emissions, Production and Intensity Information (continued)

CO_2 Emissions from the Combustion of Biomass
Enter CO_2 emissions in tonnes arising from the combustion of biomass materials.

Note: *CO_2 emissions from the combustion of biomass must be included in the calculation of the emissions threshold but is not included in the calculation of the total annual emissions (TAE) for the facility. The formula used to calculate TAE automatically excludes CO_2 emissions from the combustion of biomass.*

CO_2 Emissions from Aerobic Decomposition of Waste
Enter CO_2 emissions in tonnes arising from the aerobic decomposition of biomass waste materials in tonnes.

Note: *CO_2 emissions from aerobic decomposition of waste must be reported and included in the calculation of the emissions threshold but is not included in the calculation of the total annual emissions (TAE) for the facility. The formula used to calculate TAE automatically excludes CO_2 emissions aerobic decomposition of waste.*

Worksheets B5, B5(2) and B5(3)
Section B: Emissions, Production and Intensity Information (continued)

Total CO_2, CH_4 and N_2O Emissions
The total CO_2, CH_4 and N_2O emissions are all automatically calculated using values already entered in the Baseline Application form.

Total Annual Emissions Calculation
The total direct emissions, GHG emissions from industrial process and total annual emissions fields are all automatically calculated using values already entered in the Baseline Application form.

Public availability of GHG emissions information
Using the checkboxes, indicate whether or not greenhouse gas emissions data (gas total or source level) is publicly available for the baseline year.

Note: *Facilities using the Baseline Emissions Intensity Application for New/Established Stand-Alone Cogeneration Facilities will also need to indicate if production information is publicly available.*

Worksheets B6, B6(2) and B6(3)
Section B: Emissions, Production and Intensity Information (continued)

Note: *These worksheets do not apply to facilities using the Baseline Emissions Intensity Application for New/Established Stand-Alone Cogeneration Facilities.*

Production Information
Enter the product name, quantity and SI units for each product at the facility that is included in determining the total production (P) for the baseline year. Production is the quantity, expressed in the applicable unit of production, of end product produced by a facility. Facilities that have an end product must use an end product for their total production. Facilities that do not have an end product (i.e. landfills) may use any input, output or other thing specified under subsection (4) of the *Specified Gas Emitters Regulation*. Enter the total production (P) value and units calculated for the baseline year (combine all applicable production items in an appropriate manner).

List what is included in total production (P). Facilities that produce multiple products must explain (include formulas) how total production was calculated.
Enter the required information.

Public Availability of Production Information
Using the checkbox, indicate whether production information is publicly available for the baseline year.

Worksheets B7, B7(2) and B7(3)
Section B: Emissions, Production and Intensity Information (continued)

Note: *These worksheets do not apply to facilities using the Baseline Emissions Intensity Application for New Facilities or to facilities using the Baseline Emissions Intensity Application for New/Established Stand-Alone Cogeneration Facilities.*

Emissions Intensity
Total annual emissions and total production are used to automatically calculate the emissions intensity value for the baseline year. Enter the appropriate units for the emissions intensity value.

7.4 *Section C: Calculation Methods*

This section of the Baseline Application requires:

- Listing of the general category of calculation methodology used for CO_2, CH_4 and N_2O by source category;
- Listing of the calculation methodology reference used for CO_2, CH_4 and N_2O by source category;
- The description of greenhouse gas emissions estimation and calculation methods and reference materials used in calculating the facility's greenhouse gas emissions;
- The identification of the years a facility previously reported greenhouse gas emissions to Alberta Environment under the *Specified Gas Reporting Program*;
- The reporting of any change in emissions calculation methods between years; and
- The reason why the calculation methods were modified.

Worksheet C1
Section C: Calculation Methods

Method Type
List all the method categories that were used to calculate emissions of each gas by source category.

Enter 1 for monitoring/direct measurement, 2 for intermittent (periodic) direct measurement, 3 for calculated based on measured surrogate parameters, 4 for extrapolated from historical data, 5 for estimated from design requirements, 6 for estimated from agreements, 7 for mole balance with efficiency factors, 8 for equipment-specific emission factors, 9 for manufacturer's emission factors, 10 for models based on surrogate parameters, 11 for generic emission factors and 12 for top-down emission factors.

Worksheet C2
Section C: Calculation Methods (continued)

Citation of Method References
List all the method references that were used to calculate emissions of each gas by source category.

Worksheets C3, C4, C5 and C6
Section C: Calculation Methods (continued)

Provide details on the method(s) used including the rationale for selection of the specific methods for determining the facility's direct greenhouse gas emissions. You may provide this information in a separate document. This information should include emission estimation/calculation methodologies, emission factors, equations, calculations and citation of reference materials. **Consistent methods and reference materials must be used across all baseline years**.

Note any differences in the methods or information used between the 2003, 2004 and 2005 calculations (for established facilities only). Provide the reasons for using different methods across baseline years. Additional space is provided in the next worksheets. If still more space is required or if this information is contained in another document, submit the additional information with this Baseline Application. Fuel factors and fuel analysis for integrated cogeneration may be reported in section D of the Application.

Worksheets C7, C8, C9 and C10
Section C: Calculation Methods (continued)

In the space provide, indicate if, and in which years, you have previously reported greenhouse gas emissions to Alberta Environment under the Specified Gas Reporting Program.

If the emissions reported in the Baseline Application differ from the emissions reported previously under the Specified Gas Reporting Program indicate in the space below why and where these differences occur. Also indicate the impact this has had on the reported values (i.e. increased or decreased by X tonnes, etc). By providing the greenhouse gas emissions for the years previously reported in this Baseline Application, you will not be required to resubmit updated emissions data under the Specified Gas Reporting Program.

Alberta Environment will review the submitted data and upon accepting the data will update the data collected under the Specified Gas Reporting Program (where applicable).

Additional space is available in the next worksheets. If more space is required, submit the additional information with this Baseline Application. Facilities restating 2004, 2005 or 2006 emissions data should contact Environment Canada to determine whether they need to restate their emissions under the National Mandatory Greenhouse Gas Reporting Program.

7.5 Section D: Cogeneration Information

This section of the Baseline Application permits stand-alone cogeneration facilities or facilities with integrated cogeneration to enter information on their cogeneration operation. Facilities with integrated cogeneration units may choose not to complete this section of the Baseline Application. This will result in no adjustments being made to their Baseline Emissions Intensity calculation for their cogen unit.

Worksheets D1, D1(2) and D1(3)
Section D: Cogeneration Information

Cogeneration Information
Indicate using the N/A checkbox whether there was an integrated cogeneration unit operational during the baseline year. If no integrated cogeneration unit was present or you do not wish to calculate deemed greenhouse gas emissions for your cogen then simply enter an "X" and you are then not required to enter anything else in this worksheet or in worksheet D2 for the appropriate baseline year. Facilities using the Baseline Emissions Intensity Application Form for New/Established Stand-Alone Cogeneration facilities will not see this checkbox.

GHG Emissions (Cogen)
Enter the *total greenhouse gas emissions* in tonnes CO_2e from the cogeneration unit.

Fuel Use Information
Enter the *type*, *quantity*, *units* and *percent mixture* of the fuels used by the cogeneration unit.

Heat
Enter the *total heat production from cogeneration* (H) in GJ. *Deemed input energy attributed to heat* (E_H) in GJ is automatically calculated. Enter the *mass/volume of fuel deemed used to produce heat* (M_H) in the appropriate units. Enter the *deemed greenhouse gas emissions from heat production* (D_H) in tonnes CO_2e.

Electricity
Enter the *total electricity generation* (E) in MWh. *Deemed greenhouse gas emissions from electricity generation* (D_E) in tonnes CO_2e is automatically calculated. Facilities

using the Baseline Emissions Intensity Application Form for Stand-Alone Cogeneration Facilities will also have the *intensity metric for cogeneration electricity* (I_E) in tonnes CO_2e / MWh automatically calculated.

Adjustments
The *total cogeneration baseline adjustment* (A_T) is automatically calculated.

Worksheets D2, D2(2) and D2(3)
Section D: Cogeneration Information (continued)

If fuel factors were used to calculate greenhouse gas emissions from cogeneration, provide the factors used with references.
Enter the required information. If fuel factors were not used simply enter "not applicable".

If fuel analysis was used to calculate greenhouse gas emissions from cogeneration, provide a synopsis of the fuel analysis.
Enter the required information. If fuel analysis was not used simply enter "not applicable".

7.6 *Section E: Baseline Calculation*

In this section the facility baseline emissions intensity is calculated based on the emissions and production information already entered in the Baseline Application. Enter the appropriate units for the baseline emissions intensity value (excluding facilities using the Baseline Emissions Intensity Application Form for New/Established Stand-Alone Cogeneration Facilities).

Worksheet E
Section E: Baseline Calculation

Baseline Emissions Intensity

For facilities using the Baseline Emissions Intensity Application Form for New/ Established Facilities:
Emissions (TAE) and production (P) information are used to automatically calculate the baseline emissions intensity (BEI). Facilities that completed section D (cogeneration information) will have their deemed greenhouse gas emissions from heat (D_H) applied to the total annual emissions (less emissions from the cogeneration unit) in this calculation.

For facilities using the Baseline Emissions Intensity Application Form for New/ Established Stand-alone Cogeneration Facilities:
Deemed greenhouse gas emissions attributed to heat (D_H) and total heat production produced by the cogeneration facility (H) are used to automatically calculate the baseline emissions intensity (BEI).

7.7 Section F: Additional Comments

This section of the Baseline Application permits the entering of additional information and asks the Person Responsible to provide the facility or company's website.

Worksheet F
Section F: Additional Comments

Facility or Company Website
Enter the website of the facility or reporting company.

Comments
Enter any additional comments or information that is relevant to the Baseline Application.

7.8 Section G: Third Party Auditor Information

Enter the contact information for the Third Party Auditor, including a statement explaining how the Auditor satisfies the qualification requirements as stipulated by Alberta Environment. The information entered in this section will carry forward to the Conflict-of-Interest Checklist, Statement of Qualification and Statement of Verification.

Worksheet G
Section G: Third Party Auditor Information

Third Party Auditor Information
Enter the first and last name, professional designation, position/title, telephone and fax numbers, email address, country, province/territory/state, mailing address, city or district or municipality or county (whichever is most applicable) and postal code/zip code of the Third Party Auditor.

Auditing Company Information
Enter the auditing company name, phone and fax numbers, country, province/territory/state, mailing address, city or district or municipality or county (whichever is most applicable), postal code/zip code and company website (if applicable).

Auditor Qualifications
Explain how the auditor satisfies the Qualification requirements for Third Party Auditors.

7.9 *Baseline Emissions Intensity Application Form Submission Information*

This section provides instructions on when and where the Baseline Application and associated documents must be submitted. Check the appropriate box if the facility is requesting confidentiality for some or all of the Baseline Application under the *Specified Gas Emitters Regulation*. Facilities wishing to pursue a confidentiality request **must submit a written request** with appropriate justification and supporting documentation by mail or courier to the Director by the submission deadline Baseline Emissions Intensity Applications as specified in section 20 of the *Regulation*.

Note: It is an offence under the *Climate Change and Emissions Management Act* to provide false or misleading information. Maximum penalties upon conviction are significant and can include, in the case of knowingly providing false or misleading information, imprisonment: see ss. 44 and 45 of the *Climate Change and Emissions Management Act*.

Worksheet: Submission Information

7.10 Conflict-of-Interest Checklist

This section requires the Third Party Auditor to complete a Conflict-of-Interest Checklist to confirm their independence from the facility or reporting company. Enter an "X" in the appropriate box for each of the statements. If any of the statements are true the Person Responsible should contact Alberta Environment for further instruction if it is still considering to engage this Third Party Auditor. Please note that if the potential conflict-of-interest is a sufficient perceived or actual threat to impartiality or cannot be effectively managed, a Third Party Audit Report by that Third Party Auditor will not be acceptable to Alberta Environment. A signed original Conflict-of-Interest Checklist (not a copy) must be submitted to Alberta Environment.

Worksheet: CoI Checklist

7.11 Statement of Qualification

The Statement of Qualification must be printed on letterhead and must be signed and dated by the Third Party Auditor. It states that the auditor meets or exceeds the qualifications of Third Party Auditors as stated in section 18 of the *Regulation*, and this *Technical Guidance Document for Baseline Emissions Intensity Applications*. A signed original SoQ (not a copy) must be submitted to Alberta Environment.

Worksheet: SoQ

7.12 Statement of Verification

The Statement of Verification (SoV) requires the Third Party Auditor to:

- Describe the objective of the review and the entity or portion thereof, the subject matter and the time period covered by the review,
- Identify the GHG assertion,
- Describe the responsibilities of management and the reviewer,
- Identify the applicable standards in accordance with which the review was conducted,
- Identify the criteria against which the GHG assertion and supporting evidence was evaluated,
- State a conclusion that conveys the level of assurance being provided and/or any reservation the Third Party Auditor may have,
- State the date of the report
- Identify the name of the reviewer (or firm)

The Statement of Verification must be printed (no letterhead required), signed and dated by the Third Party Auditor. A signed original SoV (not a copy) must be submitted to Alberta Environment.

Worksheet: SoV

7.13 Statement of Certification

The Statement of Certification (SoC) requires the designated Certifying Official of the facility (having the authority to bind the reporting company) to certify that they have reviewed the Baseline Application, and have exercised due diligence to ensure that the submitted data and information is true and complete and the values and information throughout the Application are accurate, based on reasonable estimates using available data and information. The Statement of Certification must be printed on company letterhead and signed and dated by the Certifying Official. A signed original SoC (not a copy) must be submitted to Alberta Environment.

Worksheet: SoC

8.0 Data Confidentiality and Access to Information

8.1 Request for Confidentiality

In accordance with Section 16 of the *Regulation*, the Person Responsible may request that certain information in the Baseline Application be kept confidential for a period of up to 5 years, on the basis that the information is commercial, financial, scientific or technical information that would reveal proprietary business, competitive or trade secret information about a specific facility, technology or corporate initiative.

One confidentiality request with supporting justification and documentation must be submitted for each facility.

Submit the written request, including appropriate justification and supporting documentation, to Alberta Environment by the deadline for applying for a baseline emissions intensity as specified in section 20 of the *Regulation* by mail or courier at:

Director
Alberta Environment
12th Floor, Oxbridge Place
9820-106 Street
Edmonton, Alberta
T5K 2J6

Figure 6 describes the confidentiality request and evaluation process for the *Specified Gas Emitters Program*.

The Director will notify the Person Responsible in writing of the decision reached within 150 days of receiving the request. While the Director is considering a request for confidentiality the information in the portions of the application to which the request relates is prescribed information.

Under Section 17 of the *Regulation*, the Director must submit a report on confidentiality requests to the Information and Privacy Commissioner, including the number of confidentiality requests received, number of confidentiality requests approved and the period of time prescribed for each approved request.

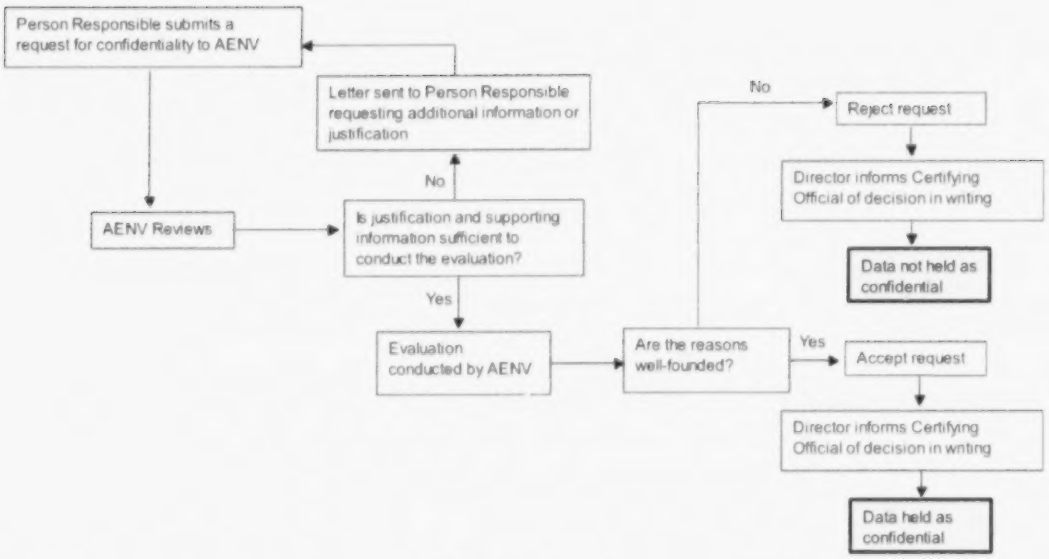
Person Responsible submits a request for confidentiality to AENV
Letter sent to Person Responsible requesting additional information or justification
No
AENV Reviews
Is justification and supporting information sufficient to conduct the evaluation?
Yes
Evaluation conducted by AENV
Are the reasons well-founded?
No
Reject request
Director informs Certifying Official of decision in writing
Data not held as confidential
Yes
Accept request
Director informs Certifying Official of decision in writing
Data held as confidential

Figure 6: Confidentiality Process for the *Specified Gas Emitters Program.*

8.2 Access to Baseline Application Information

The *Climate Change and Emissions Management Act* enables the publishing of prescribed information in aggregated form so that the prescribed information from a particular facility cannot be identified (see Section 59(3) of the *Act*).

Section 14 of the *Regulation* enables the publishing of the non-confidential information contained in the Baseline Application or Compliance Report in any form or manner the Director considers appropriate.

Written requests for information contained in a Baseline Application or Compliance Report that has not been deemed confidential can be made directly to the facility that submitted the Application or to the Director. Figure 7 shows the process for requesting access to information reported under the *Regulation*.

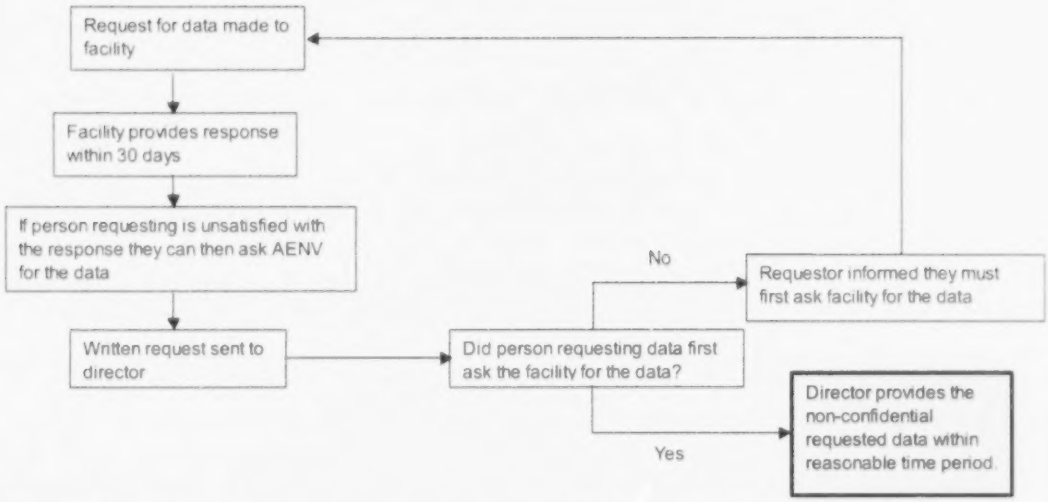
Request for data made to facility
Facility provides response within 30 days
If person requesting is unsatisfied with the response they can then ask AENV for the data
Written request sent to director
Did person requesting data first ask the facility for the data?
No
Requestor informed they must first ask facility for the data
Yes
Director provides the non-confidential requested data within reasonable time period

Figure 7: Process for Requesting Non-Confidential Information Reported Under the *Specified Gas Emitters Regulation*.

9.0 Cogeneration

(Note: This section of the guidance document applies only to stand-alone and integrated cogeneration facilities.)

Alberta Environment acknowledges the environmental benefit associated with the higher energy efficiencies generally afforded by cogeneration operations. To recognize this benefit within the context of the *Specified Gas Emitters Program*, Alberta Environment permits an adjustment to the baseline emissions intensity of cogeneration facilities. This is intended to reduce the overall reduction obligation by a factor that is generally indicative of the efficiency gains afforded through cogeneration.

The methodology presumes that during the baseline period, the heat was sourced from a conventional boiler operating at an efficiency of 80% and the electricity was produced from an NGCC (Natural Gas Combined Cycle) electricity generation plant with a greenhouse gas intensity of 0.418 tonnes/MWh. Corresponding deemed greenhouse gas emissions for the heat and electricity generation are then calculated using the formula provided later in this section. **Stand-alone and integrated cogeneration facilities may choose to calculate deemed greenhouse gas emissions in order to obtain an adjustment to their baseline emissions intensity or they may choose to be treated as a non-cogeneration facility and calculate their baseline emissions intensity using the methods described in section 5.5 of this guide.**

Note: *Stand-alone cogeneration facilities that wish to calculate deemed greenhouse gas emissions must use the Baseline Emissions Intensity Application Forms for New/Established Stand-alone Cogeneration facilities. Stand-alone cogeneration*

facilities that do not wish to calculate deemed greenhouse gas emissions must use the Baseline Emissions Intensity Application Forms for New/Established Facilities and should not complete section D (integrated cogeneration information).

Note: *Integrated cogeneration facilities that wish to calculate deemed greenhouse gas emissions must use the Baseline Emissions Intensity Application Forms for New/Established Facilities and complete section D (integrated cogeneration information). Integrated cogeneration facilities that do not wish to calculate deemed greenhouse gas emissions must use the Baseline Emissions Intensity Application Forms for New/Established Facilities but should not complete section D (integrated cogeneration information).*

An adjustment factor (A_T) is also calculated (for information purposes only) as a difference between deemed greenhouse gas emissions and actual greenhouse gas emissions for the baseline period to estimate the impact of the methodology on the environment.

Some circumstances, like the use of non-conventional fuel, may warrant a different approach that is more representative of their operation and for which these deemed values are not appropriate or relevant. In this event this guidance document allows the Person Responsible to propose an alternative calculation methodology to the Director designated under the *Specified Gas Emitters Regulation*.

9.1 Cogeneration Reporting Requirements

For facilities choosing to calculate deemed greenhouse gas emissions, The Person Responsible must provide the following information in the Baseline Emissions Intensity Application Form:

- Total greenhouse gas emissions (G_T) in tonnes CO_2e from the cogeneration facility in the baseline year(s);
- Fuel used by the cogeneration facility in the baseline year(s);
- If fuel factors are used to calculate the greenhouse gas emissions, provide the factors with references;
- If fuel analysis is used to calculate the greenhouse gas emissions, provide a synopsis of the fuel analysis;
- Total heat production (H) in GJ by the cogeneration facility in the baseline year(s);
- Mass/volume of fuel deemed used to produce heat in the baseline year(s);
- Deemed greenhouse gas emissions from heat production (D_H) in tonnes CO_2e in the baseline year(s);
- Total electricity production (E) in MWh by the cogeneration facility in the baseline year(s);

- Deemed greenhouse gas emissions from electricity generation (D_E) in tonnes CO_2e in the baseline year(s); and
- Total Cogeneration Baseline Adjustment (A_T) in tonnes CO_2e in the baseline year(s);

The Person Responsible should also provide the following information either in the comments section of the Baseline Application or in a separate document:

- Explanation of how heat calculations were done, including the enthalpies;
- Various thermal streams and annualized flow averages, temperature averages and pressure averages for each stream;
- Simple conceptual/logic diagram of the cogeneration layout; and
- Hours of operation of the cogeneration facility in the baseline year(s).

9.2 Total Annual Greenhouse Gas Emissions

As a first step the Person Responsible must calculate the total annual greenhouse gas emissions from the cogeneration operation. This is calculated using the equation:

$$G_T = f \times M_F$$

Where:

G_T	=	Total annual greenhouse gas emissions from the cogeneration facility	[tonnes CO_2e]
f	=	Emission factor for the fuel used in the cogeneration facility	[units of fuel used]
M_F	=	Mass/volume of fuel used in the cogeneration facility	[units of fuel used]

The Person Responsible may choose to:

1) Calculate site-specific emission factors for the fuel used in the facility based on compositional analysis of the fuel. If this method is used, the Person Responsible should report the detailed fuel analysis and calculation procedures used to develop the emission factor.
2) Use an industry standard emission factor. If this method is used, the Person Responsible should provide references for the source of the emission factor.

9.3 Deemed Greenhouse Gas Emissions for Heat Generation

9.3.1 Standard Calculation Methodology for Determining Heat Production from the Facility

Mass energy balance principle is acceptable by Alberta Environment to calculate net heat production from a cogeneration facility. It is recognized that within a large facility, host facility and cogeneration facility are interconnected through various thermal streams that

help in exchanging different types of steam. Mass energy balance, if done correctly, captures all the components of exchange and accurate heat transfer can be quantized.

The net heat produced by the cogeneration facility is calculated based on the difference between:

- The total energy content of the steam leaving the cogeneration facility; and
- The energy content of the condensate (hot water) returning to the cogeneration facility.

These values would be aggregated over the reporting period.

It means[3]:

$$\mathbf{H_t = \sum_{i=1}^{n} \{h(steam)_i \times M(steam)_i\} - \sum_{i=1}^{m} \{h(condensate)_i \times M(condensate)_i\}}$$

Where:

H_t	=	Heat produced by the cogeneration facility per hour	[kJ/h]
$h(steam)_i$	=	Enthalpy of i streams of steam to the steam host	[kJ/kg]
$h(condensate)_i$	=	Enthalpy of i streams of condensate returned to the cogeneration unit	[kJ/kg]
$M(steam)_i$	=	Mass flow rate of i streams of steam	[kg/h]
$M(condensate)_i$	=	Mass flow rate of i streams of condensate	[kg/h]
n	=	Total number steam streams	
M	=	Total number of condensate streams	

Therefore, total heat produced by the cogeneration facility during the baseline year(s), H, will be:

$$\mathbf{H = H_t \times Hours\ of\ Operation}$$

Note: *Some cogeneration operations will have a more complex heat transfer profile. These sites should calculate their net heat production based on their actual heat balance.*

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[3] *Alberta Air Emission Standards for Electricity Generation*. Alberta Environment, Government of Alberta. December 2005.

9.3.2 Calculate the Deemed Greenhouse Gas Emissions for Heat Production

In this step the Person Responsible will first determine the input energy deemed to be attributed to heat production based on a boiler thermal efficiency of 80%. Input energy is the energy derived from fuel combustion that is attributable to heat production.

$$E_H = \frac{H}{0.8}$$

Where:

E_H	=	Deemed input energy attributed to heat production	[GJ]
H	=	Total heat produced by the cogeneration facility during the baseline year(s)	[GJ]

Next, calculate the fuel required to generate the deemed input energy.

$$M_H = \frac{E_H}{V}$$

Where:

M_H	=	Mass/volume of fuel deemed to be used to produce heat	[units of fuel used]
V	=	Fuel Heating Value	[units of fuel used]

Different sectors have different conventions regarding the use of Higher Heating Value (HHV) or Lower Heating Value (LHV) in energy calculations. The Person Responsible may use either HHV or LHV, contingent upon the convention applicable within their sector. However, the Person Responsible must ensure that the chosen heating value convention (either HHV or LHV) is consistently applied across all calculations both in the baseline and in target years.

Finally, calculate the deemed greenhouse gas emissions allocated to heat production.

$$D_H = f \times M_H$$

Where:

D_H	=	Deemed greenhouse gas emissions from heat production	[tonnes CO_2e]
f	=	Emission factor for the fuel used in the stand-alone boiler facility.	[units of fuel used]

9.4 Deemed Baseline Greenhouse Gas Emissions for Electricity Generation

9.4.1 Measure the Total Electricity Generated by the Cogeneration Facility

The Person Responsible will measure the total amount of electricity (gross) generated by the cogeneration facility. This value will cover all electricity from the facility including electricity used by the heat host, if any. This methodology makes no distinction between electricity used within the heat host's process and that exported to the Alberta electricity grid.

9.4.2 Calculate the Deemed Greenhouse Gas Emissions for Electricity Generation

In this step the Person Responsible will determine baseline greenhouse gas emissions based on a NGCC turbine with a deemed greenhouse gas emission intensity of 0.418 tonnes/MWh.

$$D_E = 0.418 \times E$$

Where:

D_E	=	Deemed greenhouse gas emissions from electricity generation	[tonnes CO_2e]
E	=	Total electricity generation by the cogeneration facility during the baseline year(s).	[MWh]

9.5 Cogeneration Adjustments

The adjusted baseline emissions from the cogeneration facility will be reported as the actual facility emissions plus an adjustment. This information is reported to Alberta Environment to ensure that provincial greenhouse gas emission inventories reflect actual, not adjusted, emissions in any given year. This will prevent double counting within the provincial and national inventories. This adjustment is for information purposes only and is not applied to the actual baseline emissions intensity calculation for cogeneration facilities.

Total Cogeneration Baseline Adjustment is equal to:

$$A_T = [D_H + D_E] - G_T$$

Where:

A_T	=	Total Cogeneration Baseline Adjustment	[tonnes CO_2e]
D_H	=	Deemed greenhouse gas emissions attributed to heat production	[tonnes CO_2e]

D_E	=	Deemed greenhouse gas emissions attributed to electricity generation	[tonnes CO_2e]
G_T	=	Total annual greenhouse gas emissions from the cogeneration facility	[tonnes CO_2e]

9.6 Baseline Intensities

This section describes the calculation of the baseline emissions intensity for integrated and stand-alone cogeneration facilities. Integrated cogeneration units may have multiple products depending on the operations that occur at the facility. Production for these facilities does not include the electricity generated by the integrated cogeneration unit. Stand-alone cogeneration facilities produce two products: heat and electricity, however, the baseline emissions intensity is based only on heat.

9.6.1 Integrated Cogeneration Facility

For facilities with integrated cogeneration units, the deemed baseline intensity for the electricity will remain the same and greenhouse gas emissions attributed to the heat production will be added to the total greenhouse gas emissions from the host facility (excluding emissions attributed to electricity generation from the integrated cogeneration unit). The following formula are used:

$$I = \frac{(TAE - G_T) + D_H}{P}$$

$$BEI = \frac{I_{2003} + I_{2004} + I_{2005}}{3}$$

Where:

I	=	Greenhouse gas emissions intensity for each baseline year.	[tonnes CO_2e / MWh]
BEI	=	Baseline emissions intensity.	[tonnes CO_2e / MWh]
TAE	=	Total annual greenhouse gas emissions from entire the facility for each baseline year. ***(excluding:*** *GHG emissions from industrial process, CO_2 emissions from combustion of biomass and CO_2 emissions from aerobic decomposition of waste).*	[tonnes CO_2e]
G_T	=	Total annual greenhouse gas emissions from the cogeneration facility for each baseline year.	[tonnes CO_2e]
D_H	=	Deemed greenhouse gas emissions from heat production for each baseline year.	[tonnes CO_2e]

P	=	Production for each baseline year.	[appropriate units of production]

9.6.2 Stand-Alone Cogeneration Facility

For stand-alone cogeneration facilities (as per the facility definition within the *Regulation*) the emission intensity for each year of the baseline determination is calculated using the following equation:

$$BEI = \left[\frac{D_H}{H} \right]$$

Therefore, the baseline intensity for the 2003-2005 period will be:

$$BEI = \left[\frac{D_{H,2003}}{H_{2003}} + \frac{D_{H,2004}}{H_{2004}} + \frac{D_{H,2005}}{H_{2005}} \right] /3$$

Where:

BEI	=	Baseline Emissions intensity.	[tonnes CO_2e / GJ]
D_H	=	Deemed greenhouse gas emissions attributed to heat production	[tonnes CO_2e]
H	=	Total heat produced by the cogeneration facility during the baseline year(s).	[GJ]

9.7 Marginal Environmental Improvement

In the assessment of the cogeneration adjustment the Director will consider if there is tangible environmental improvement attributable to the operation of the cogeneration facility. If there is only marginal environmental improvement, all or part of the Cogeneration Adjustment may be removed from the baseline emission intensity.

Clarification: *This situation could arise if the cogeneration facility is using older technology or high carbon intensity fuels. These situations will be evaluated on a site-specific basis.*

9.8 Significant Change in Cogeneration Unit Operation

Consideration would be given to any changes over time of the production of heat and electricity from the cogeneration operation. If the operation of the cogeneration facility changes such that there is no material production of one of the energy products at some future date, all or part of the Cogeneration Adjustment may be removed from the baseline emissions intensity.

Clarification: *This situation could arise if the cogeneration facility is associated with an operation that decreases its take of energy from the cogeneration plant.*

Glossary of Terms

Act means the *Climate Change and Emissions Management Act* (source: *Specified Gas Emitters Regulation*).

Actual emissions intensity means total annual direct emissions, excepting industrial process emissions, CO_2 emissions from combustion of biomass and CO_2 emissions from aerobic decomposition of waste, per unit of production from a facility.

Baseline emissions intensity means the baseline emissions intensity of a facility established in accordance with Part 4 of the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

Biomass means plant materials, animal waste or any product made of either of these and includes without limitation wood and wood products, charcoal, agricultural residues and wastes including organic material above and below ground, both living and dead, such as trees, crops, grasses, tree litter, roots, municipal and industrial wastes where the organic material is biological in origin, landfill gas, bio-alcohols, black liquor, sludge gas, animal or plant-derived oils (source: *Specified Gas Reporting Standard – March 2007*).

Biomass emissions mean the direct emissions from the combustion of biomass (source: *Specified Gas Reporting Standard – March 2007*).

Climate Change and Emissions Management Fund means the fund with that name established by the *Act* (source: *Specified Gas Emitters Regulation*).

CO_2e means the 100 year time horizon global warming potential of a specified gas expressed in terms of equivalency to CO_2 set out in the Schedule in the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

Direct emissions means the release of specified gases from sources actually located at a facility, expressed in tonnes on a CO_2e basis (source: *Specified Gas Emitters Regulation*).

Emission offset means a reduction in the release of specified gases, expressed in tonnes on a CO_2e basis, that meets the requirements of section 7(1) of the *Regulation*, but does not include an emission performance credit (source: *Specified Gas Emitters Regulation*).

Emission performance credit means a reduction in the release of specified gases, expressed in tonnes on a CO_2e basis, that meets the requirements of section 9(1) of the *Regulation* (source: *Specified Gas Emitters Regulation*).

Emissions intensity means the quantity of specified gases released by a facility per unit of production from that facility (source: *Specified Gas Emitters Regulation*).

Established facility means a facility that completed its first year of commercial operation prior to January 1, 2000, or has completed eight consecutive years of commercial operation (source: *Specified Gas Emitters Regulation*).

Facility means any plant, structure or thing where an activity listed in section 2 of the Schedule of Activities to the *Environmental Protection and Enhancement Act* occurs, and a site or one or more contiguous or adjacent sites that are operated and function in an integrated fashion where an activity listed in any of sections 3 to 11 of the Schedule of Activities to the *Environmental Protection and Enhancement Act* occurs, including all the buildings, equipment, structures, machinery and vehicles that are an integral part of the activity (source: *Specified Gas Emitters Regulation*).

Flaring emissions means direct emissions from the controlled combustion of a gas or liquid stream produced on site not for the purpose of producing energy and includes without limitation emissions arising from waste petroleum incineration, hazardous emissions prevention systems (whether in pilot or active mode), well testing, natural gas gathering systems, processing plant operations, crude oil production, pipeline operations, petroleum refining and chemical fertilizer and steel production (source: *Specified Gas Reporting Standard – March 2007*). CO_2 emissions from the combustion of landfill gas are not included in flaring emissions but are included in the CO_2 Emissions from the Combustion of Biomass source category. CH_4 and N_2O emissions from the combustion of landfill gas must be reported in the Waste and Wastewater source category.

Fund credit means a fund credit described in section 8 of the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

Global warming potential or GWP is the relative measure of the warming effect that the emission of a specified gas might have on the Earth's atmosphere calculated as the ratio of the time-integrated radiative forcing that would result from the emission of one kilogram of a given specified gas to that from the emission of one kilogram of carbon dioxide (source: *Specified Gas Reporting Standard – March 2007*).

HFC Species means CHF_3, CH_2F_2, CH_3F, $C_5H_2F_{10}$ (structure: $CF_3CHFCHFCF_2CF_3$), C_2HF_5, $C_2H_2F_4$ (structure: CHF_2CHF_2), $C_2H_2F_4$ (structure: CH_2FCF_3), $C_2H_3F_3$ (structure: CHF_2CH_2F), $C_2H_3F_3$ (structure: CF_3CH_3), $C_2H_4F_2$ (structure: CH_3CHF_2), C_3HF_7 (structure: CF_3CHFCF_3), $C_3H_2F_6$ (structure: $CF_3CH_2CF_3$) and $C_3H_3F_5$ (structure: $CH_2FCF_2CHF_2$) (source: *Specified Gas Reporting Standard – March 2007*).

Industrial process emissions means direct emissions from an industrial process involving chemical or physical reactions, other than combustion, and where the primary purpose of the industrial process is not energy production (source: *Specified Gas Emitters Regulation*).

Industrial product use emissions means direct emissions from the use of a product that does not react in the process and includes without limitation SF_6 and HFC use as a cover

gas and use of SF_6 in electrical equipment (source: *Specified Gas Reporting Standard – March 2007*).

Net emissions intensity means the net emissions intensity for a facility determined in accordance with section 3(4) or 4(3) of the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

Net emissions intensity limit means the applicable maximum net emissions intensity permitted under section 3 or 4 of the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

New facility means a facility that completed its first year of commercial operation on or after December 31, 2000 or a subsequent year and has completed less than eight years of commercial operation, or a facility designated as a new facility under subsection (2) of the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

On-site transportation emissions means direct emissions resulting from fuel combustion in machinery used for the on-site transportation of products and material integral to the production process (source: *Specified Gas Reporting Standard – March 2007*).

Other fugitive emissions means direct emissions that do not fall under stationary fuel combustion emissions, industrial process emissions, venting emissions, flaring emissions, on-site transportation emissions, waste and wastewater emissions, vented raw gas emissions, CO_2 emissions from the combustion of biomass or CO_2 emissions from aerobic decomposition and includes without limitation intentional or unintentional releases of gases arising from the production, processing, transmission, storage and use of solid, liquid or gaseous fuels.

Person Responsible means, where the release of the specified gas occurs at a facility that is the subject of an approval or registration under the *Environmental Protection and Enhancement Act*, the holder of the approval or registration; at a facility that is not the subject of an approval or registration referred to in subparagraph (i) but is the subject of an approval or other authorization issued by the Alberta Energy and Utilities Board, the holder of that approval or authorization; at any other facility, the owner of the facility (source: *Specified Gas Emitters Regulation*).

PFC species means CF_4, C_2F_6, C_3F_8, C_4F_{10}, c-C_4F_8, C_5F_{12}, and C_6F_{14} (source: *Specified Gas Reporting Standard – March 2007*).

Production means the quantity, expressed in the applicable unit of production, of end product produced by a facility, or any input, output or other thing specified under subsection (4) of the *Regulation* (source: *Specified Gas Emitters Regulation*).

Regulation means the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

Specified gas means a gas listed in the Schedule in the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

Stationary fuel combustion emissions means direct emissions resulting from non-vehicular combustion of fossil or biomass fuel for the purpose of producing energy but does not include CO_2 emissions from the combustion of biomass (source: *Specified Gas Reporting Standard – March 2007*).

Total annual emissions means total direct emissions in a year, not including industrial process emissions, CO_2 emissions from combustion of biomass and CO_2 emissions from aerobic decomposition of waste.

Total direct emissions the release of specified gases from sources actually located at a facility, expressed in tonnes on a CO_2e basis (source: *Specified Gas Emitters Regulation*).

Third Party Auditor means a person who meets the requirements set out in section 18 of the *Regulation* (source: *Specified Gas Emitters Regulation*).

Total half year emissions means total direct emissions in the period July 1, 2007 to December 31, 2007, not including industrial process emissions (source: *Specified Gas Emitters Regulation*).

Unit of production means the unit of measure of production, unique to the type of facility, as approved or determined by the Director in establishing a baseline emissions intensity for the facility under Part 4 of the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

Vented raw gas means direct emissions of carbon dioxide that is recovered or is recoverable at a well from an underground reservoir and that is gaseous at the conditions under which its volume is measured or estimated. This source category includes, but is not limited to, CO_2 emissions vented from gas sweetening and formation gas (source: *Activities Designation Regulation (modified)*).

Venting emissions means direct emissions from intentional releases to the atmosphere of a waste gas or liquid stream and includes without limitation emissions of casing gas, treater, stabilizer, dehydrator off-gas, blanket gas and emissions from pneumatic devices which use natural gas as a driver, compressor start-up, pipeline and other blowdowns and metering and regulation station control loops, but does not include vented raw gas emissions (source: *Specified Gas Reporting Standard – March 2007*).

Waste and wastewater emissions means direct emissions from disposal of waste and waste or wastewater treatment and includes without limitation sources of emissions from on-site waste disposal and waste or wastewater treatment at a facility such as landfilling of solid waste, flaring of landfill gas, treatment of liquid waste and waste incineration,

but does not include CO_2 emissions from aerobic decomposition of waste (source: *Specified Gas Reporting Standard – March 2007*).

Year means calendar year unless otherwise specified in the *Specified Gas Emitters Regulation* (source: *Specified Gas Emitters Regulation*).

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